

The Original  
Wide-Use  
design  
by Simpson



**Simpson**

## STOCK PANEL METERS



OVER 1325 STOCK  
SIZES AND TYPES

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## SIMPSON ELECTRIC COMPANY

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# Simpson

## INSTRUMENTS THAT

### 1½", 2½", 3½", 4½" WIDE-VUE PANEL METERS

#### CASE STYLES



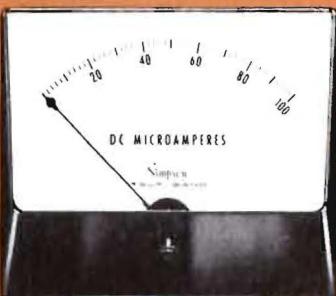
1½" Models



2½" Models



3½" Models



4½" Models

#### STOCK PANEL METER RANGES AND PRICES

CALIBRATION AND DIALS—All DC Wide-Vue meters listed below have the Simpson self-shielded movement (Calibration not affected by stray magnetic fields or magnetic mounting). All AC Wide-Vue meters have the Simpson Iron-vane type movement. AC Milliammeters and Ammeters, except 0-10 amps, are calibrated for use on 25 through 800 cps; 0-10 AC Ammeters and all AC Voltmeters are calibrated for use on 25 through 125 cps. For other specified frequencies up to 800 cps add \$1.65 to the list price.

RANGE	RESISTANCE (ohms)	1½"		2½"		3½"		4½"	
		CASE STYLE CAT. NO.	PRICE	CASE STYLE CAT. NO.	PRICE	CASE STYLE CAT. NO.	PRICE	CASE STYLE CAT. NO.	PRICE
<b>DC VOLTMETERS</b> Self Shielding Meter Movement									
0-5		1212		1227		1327		1329	
0-8									
0-10		9541	12.75	9560	13.80	9740	14.25	9880	15.75
0-15		9542	12.75	9570	13.80	9750	14.25	9890	15.75
0-25		9543	12.75	9580	13.80	9760	14.25	9910	15.75
0-30		9544	12.75	9590	13.80	9770	14.25	9920	15.75
0-50		9545	12.75	9600	13.80	9780	14.25	9930	15.75
0-100		9546	12.75	9610	13.80	9790	14.25	9940	15.75
0-150		9547	12.75	9620	13.80	9800	14.25	9950	15.75
0-200				9622	13.80	9810	14.25	9960	15.75
0-250				9623	13.80	9820	14.25	9970	15.75
0-300				9630	13.80	9830	14.25	9980	15.75
0-300	2000	9548	12.75						
0-500		9549*	16.05	9640	14.25	9840	15.00	9990	16.20
0-750				9650*	17.55	9850	15.00	10000	16.20
0-1000				9660*	17.85	9860*	18.60	10010*	19.80
<b>DC AMMETERS</b> Self Shielding Meter Movement									
0-1	.050	2431	12.75	2440	\$13.05	2640	\$13.65	2820	\$15.00
0-1.5	.033			2450	13.05	2650	13.65	2830	15.00
0-2	.025	2432	12.75	2460	13.05	2660	13.65	2840	15.00
0-3	.0166	2433	12.75	2470	13.05	2670	13.65	2850	15.00
0-5	.010	2434	12.75	2480	13.05	2680	13.65	2860	15.00
0-10	.005	2435	12.75	2490	13.05	2690	13.65	2870	15.00
0-15	.0033	2436†	12.75	2500	13.05	2700	13.65	2880	15.00
0-25	.0020	2437†	12.75	2510	13.05	2710	13.65	2890	15.00
0-30	.0017			2520	13.05	2720	13.65	2900	15.00
0-50	.001	2438†	12.75	2530	13.05	2730	13.65	2910	15.00
0-100	10.0			2540†	13.05	2740†	13.65	2920†	15.00
0-150	10.0			2550†	13.05	2750†	13.65	2930†	15.00
0-200	10.0			2552†	13.05	2760†	13.65	2940†	15.00
0-300	10.0			2554†	13.05	2770†	13.65	2950†	15.00
0-500	10.0					2780†	13.65	2960†	15.00
15-0-15	.0033					2790	14.55		
30-0-30	.0017					2800	14.55		
50-0-50	.001					2810	14.55		

\*External Multipliers, Model 183 are furnished on 1½" DC meters 500 volts or higher; on 2½" DC meters 750 volts or higher; and on 3½" and 4½" DC meters 1000 volts or higher. All others are self-contained.

†1½" DC Ammeters are self-contained through 10 amps. 15 amps and higher are supplied as 50 MV meters to be used with external shunts. 2½", 3½" and 4½" DC ammeters are self-contained through 50 amps. Higher range DC ammeters are 50 MV meters to be used with external shunts. Shunt listings are on back page.

STAY ACCURATE

Simpson

SPECIFICATIONS

SIZE	MODEL NO.	ACCURACY	SCALE LENGTH
1½"	1212	± 2% of full scale	1.5" (38.1 mm)
	1214	± 3% F. S. @ 25° C. & 60 cy. Sine Wave	
2½"	1227, 1257	± 2% of full scale	2.5" (63.8 mm)
	1247	± 3% F. S. @ 25° C. & 60 cy. Sine Wave	
3½"	1327, 1337, 1357	± 2% of full scale	3.14" (79.7 mm)
	1347	± 3% F. S. @ 25° C. & 60 cy. Sine Wave	
4½"	1329, 1339, 1359	± 2% of full scale	3.93" (100 mm)
	1349	± 3% F. S. @ 25° C. & 60 cy. Sine Wave	

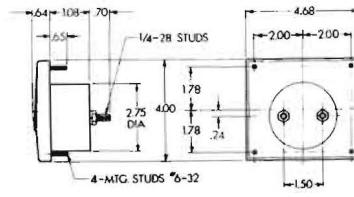
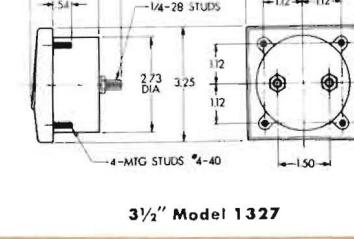
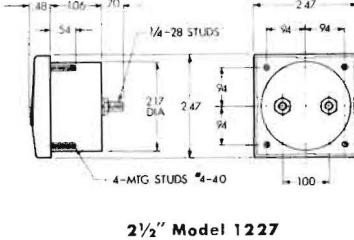
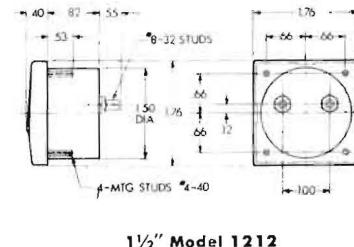
RANGE	RESISTANCE (ohms)	1½"		2½"		3½"		4½"		
		CASE STYLE	CAT. NO.							
<b>DC MICROAMMETERS</b>										
Self Shielding TAUTBAND Meter Movement										
10	4900	—	—	04303*	\$30.00	04359*	\$31.20	04459*	\$33.60	
15	1960	—	—	04304*	27.30	04361*	28.20	04461*	30.60	
25	1960	—	—	04306*	23.40	04371*	24.30	04471*	26.40	
50	960	—	—	04311*	20.55	04381*	21.00	04481*	22.65	
100	503	—	—	04321*	18.90	04391*	19.50	04491*	21.30	
<b>DC MICROAMMETERS</b>										
Self Shielding Meter Movement										
0-15	4500	—	—	4305	\$19.20	4360	\$22.50	4460	\$24.60	
0-25	2200	—	—	4310	16.65	4370	20.10	4470	22.20	
0-50†	2000	4294	\$16.20	4320	15.00	4390	15.60	4490	17.40	
0-100	2000	4295	14.40	4330	13.65	4400	14.25	4500	15.75	
0-200	1000	4296	13.05	4340	13.50	4410	13.95	4510	15.15	
0-500	200	4297	12.80	4350	13.50	4420	17.25	4520	18.60	
25-0-25	2000	4298	16.35	—	—	4430	15.75	4530	17.55	
50-0-50	2000	4302	14.55	4351	13.80	4440	14.40	4540	15.90	
100-0-100	1000	4300	13.20	4351	13.80	4450	13.65	4550	14.40	
500-0-500	46	4301	12.45	4352	13.05	4460	13.65	4560	14.40	
<b>DC MILLIAMMETERS</b>										
Self Shielding Meter Movement										
0-1	46	6163	\$12.30	6175	\$12.90	6310	\$13.50	6470	\$14.25	
0-3	46	—	—	6180	12.90	6320	13.50	6480	14.25	
0-5	23	6164	12.30	6190	12.90	6330	13.50	6490	14.25	
0-10	2.2	6165	12.30	6200	12.90	6340	13.50	6495	14.25	
0-15	2.2	6166	12.30	6210	12.90	6350	13.50	6502	14.25	
0-20	2.2	—	—	6215	12.90	6360	13.50	6524	14.25	
0-25	6.0	6167	12.75	6220	13.20	6370	13.80	6530	15.00	
0-50	3.0	6168	12.75	6230	13.20	6380	13.80	6540	15.00	
0-100	1.5	6169	12.75	6240	13.20	6390	13.80	6550	15.00	
0-150	1.0	6170	12.75	6250	13.20	6400	13.80	6560	15.00	
0-200	.75	6171	12.75	6260	13.20	6410	13.80	6570	15.00	
0-250	.60	6172	12.75	6270	13.20	6420	13.80	6580	15.00	
0-300	.50	6173	12.75	6280	13.20	6430	13.80	6590	15.00	
0-500	.30	6174	12.90	6290	13.20	6440	13.80	6600	15.00	
0-750	.20	—	—	—	—	6450	13.80	6610	15.00	
0-1000	.05	—	—	6292	13.20	6460	13.80	6620	15.00	

†Resistance of 0-50 Mic Meter in Model 1212 is 5300 ohms.

•New Model Additions.

SIMPSON PANEL METERS ARE CARRIED IN STOCK BY ELECTRONIC DISTRIBUTORS EVERYWHERE.

DIMENSIONS



SIMPSON ELECTRIC COMPANY 3

# Simpson

1½", 2½", 3½", 4½"

## WIDE-VUE PANEL METERS

### CASE STYLES



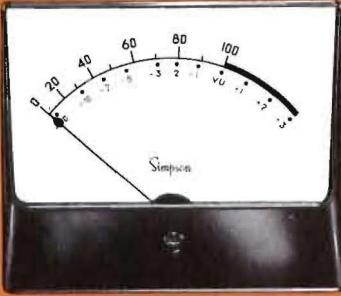
1½" Models



2½" Models



3½" Models



4½" Models

### SIMPSON STOCK METER RANGES AND PRICES

CALIBRATION AND DIALS—All DC and AC rectifier type Wide-Vue meters listed below have the Simpson self-shielded movement (Calibration not affected by stray magnetic fields or magnetic panel mounting). All AC Wide-Vue meters have the Simpson Iron-vane type movement. AC Milliammeters and Ammeters except 0-10 amps are calibrated for use on 25 through 800 cps; 0-10 AC Ammeters and all AC Voltmeters are calibrated for use on 25 through 125 cps. For other specified frequencies up to 800 cps, add \$1.65 to the list price.

### SPECIFICATIONS

SIZE	MODEL NO.	ACCURACY		SCALE LENGTH	
1½"	1212	± 2% of full scale		1.5" (38.1 mm)	
	1214	± 3% F. S. @ 25° C. & 60 cy. Sine Wave			
2½"	1227, 1237, 1257, 1277	± 2% of full scale		2.5" (63.8 mm)	
	1247	± 3% F. S. @ 25° C. & 60 cy. Sine Wave			
3½"	1327, 1337, 1357, 1377	± 2% of full scale		3.14" (79.7 mm)	
	1347	± 3% F. S. @ 25° C. & 60 cy. Sine Wave			
4½"	1329, 1339, 1359, 1379	± 2% of full scale		3.93" (100 mm)	
	1349	± 3% F. S. @ 25° C. & 60 cy. Sine Wave			
RANGE	RESISTANCE (ohms)	1½" CASE STYLES CAT. NO. PRICE	2½" CASE STYLES CAT. NO. PRICE	3½" CASE STYLES CAT. NO. PRICE	4½" CASE STYLES CAT. NO. PRICE
DC MILLIVOLT METER Self Shielding Meter Movement		MODEL 1212	MODEL 1227	MODEL 1327	MODEL 1329
0-50	10	7005 \$12.75	7010 \$13.05	7020 \$13.65	7030 \$15.00
50-0-50	10	— —	— —	7021* 13.65	7031* 15.00
RF AMMETERS Self Shielding Meter Movement				MODEL 1337	MODEL 1339
0-1	.343	— —	— —	2970 \$15.90	3050 \$18.15
0-1.5	.200	— —	— —	2980 15.90	3060 18.15
0-2	.120	— —	— —	2990 15.90	3070 18.15
0-2.5	.10	— —	— —	3000 15.90	3080 18.15
0-3	.08	— —	— —	3010 15.90	3090 18.15
0-5	.045	— —	— —	3020 15.90	3100 18.15
0-8	.031	— —	— —	3030 15.90	3110 18.15
0-10	.023	— —	— —	3040 15.90	3120 18.15
RF MILLIAMMETERS					
0-500	.63	— —	— —	5362 \$18.75	5364 \$21.15
AC VOLTMETERS RECTIFIER TYPE Self Shielding Meter Movement		MODEL 1214	MODEL 1247	MODEL 1347	MODEL 1349
0-5	2000 OHMS PER VOLT	10011 \$17.70	10015 \$16.50	10020 \$18.30	10090 \$20.10
0-10		10012 17.70	10016 16.50	10030 18.30	10100 20.10
0-15		— —	— —	10040 18.30	10110 20.10
0-50		— —	— —	10050 18.30	10120 20.10
0-150		10013 17.70	10017 16.50	10060 18.30	10130 20.10
0-300		10014 17.70	10018 16.50	10070 18.30	10140 20.10
VOLUME LEVEL INDICATORS DECIBEL METERS Self Shielding Meter Movement			MODEL 1247	MODEL 1347	MODEL 1349
RANGE Zero Power Level—6 MW. 500 Ohm Line					
General-Purpose 5000 ohms		— —	3483 \$18.35	3485 \$19.60	3487 \$20.25
VOLUME LEVEL INDICATORS V. U. METERS† Self Shielding Meter Movement Reference Level—1 MW. 600 Ohm Line		MODEL 1214	MODEL 1247	MODEL 1347	MODEL 1349
A—Scale B—Scale		10472 \$19.80	10474 \$21.90	10480 \$22.50	10490 \$23.70
		— —	— —	10550 22.50	10560 23.70
DC GALVANOMETERS Self Shielding Meter Movement SENSITIVITY RESIST. MICRO- AMPERES (ohms)		MODEL 1212	MODEL 1227	MODEL 1327	MODEL 1329
50-0-50	500-0-500	46 3692 \$12.45	3700 \$12.90	3730 \$13.65	3732 \$14.40
50-0-50	75-0-75	2000 3694 13.20	3710 13.95	3720 15.15	3734 16.65

†Simpson VU meters meet all the Electrical and Ballistic specifications established by Bell Laboratories and American Standards Association as required by broadcasting, communication and sound engineers. They are available with either type A or B scales. Type A scale stresses the level in VU for monitoring wire lines. Type B scale stresses per cent use of transmitter output and is the standard for broadcast service.

\*New Model additions.

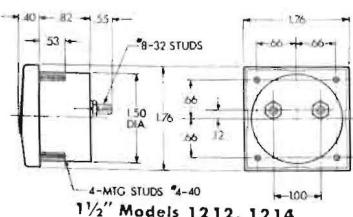
## WIDE-VUE PANEL METERS

RANGE	RESISTANCE (ohms)	2½" CASE STYLE		3½" CASE STYLE		4½" CASE STYLE	
		CAT. NO.	PRICE	CAT. NO.	PRICE	CAT. NO.	PRICE
<b>AC VOLTMETERS</b> Iron Vane Type Movement		<b>MODEL 1257</b>		<b>MODEL 1357</b>		<b>MODEL 1359</b>	
0-5	33	—	—	10160	\$12.60	10260	\$14.40
0-10	133	9670	\$12.30	10170	12.60	10270	14.40
0-15	300	9675	12.30	10180	12.60	10280	14.40
0-25	833	9680	12.45	10190	13.05	10290	14.40
0-50	3,333	9690	12.45	10200	13.05	10300	14.40
0-100	16,666	9695	12.75	10210	13.65	10310	14.40
0-150	25,000	9700	13.05	10220	13.95	10320	15.00
0-250	41,166	9705	13.05	10230	13.95	10330	15.00
0-300	50,000	9710	13.05	10240	13.95	10340	15.00
0-500	83,333	9715*	16.65	10250*	17.85	10350*	19.05
<b>AC AMMETERS</b> Iron Vane Type Movement		<b>MODEL 1257</b>		<b>MODEL 1357</b>		<b>MODEL 1359</b>	
0-1	.287	2560	\$11.70	3130	\$12.45	3260	\$14.55
0-1.5	.185	2570	11.70	3140	12.45	3270	14.55
0-2	.115	—	—	3150	12.45	3280	14.55
0-3	.027	2575	11.70	3160	12.45	3290	14.55
0-5	.012	2580	11.70	3170	12.45	3300	14.55
0-10	.0031	2590	11.70	3180	12.45	3310	14.55
0-15	.0022	2599	11.70	3190	12.45	3320	14.55
0-25	.0003	2609	12.30	3200	12.90	3330	15.00
0-30	.0003	2615	12.30	3205	12.90	3335	15.00
0-50	.0006	2619	12.30	3210	12.90	3340	15.00
0-75	.012	—	—	3215	13.95	3345	16.05
0-100	.012	2622†	11.70	3220†	12.45	3350†	14.55
0-150	.012	2624†	11.70	3230†	12.45	3360†	14.55
0-200	.012	2626†	11.70	3240†	12.45	3370†	14.55
0-300	.012	2627†	11.70	3250†	12.45	3380†	14.55
<b>AC MILLIAMMETERS</b> Iron Vane Type Movement		<b>MODEL 1257</b>		<b>MODEL 1357</b>		<b>MODEL 1359</b>	
0-10	2,000	6294	\$11.70	6625	\$12.45	6665	\$14.55
0-50	80	6295	11.70	6630	12.45	6670	14.55
0-100	20	6296	11.70	6640	12.45	6680	14.55
0-250	5	6297	11.70	6650	12.45	6690	14.55
0-500	.9	6300	11.70	6660	12.45	6699	14.55
<b>WATTMETERS</b> DYNAMOMETER TYPE Single Phase		Wattmeters calibrated for a frequency range		for either magnetic or of 25-125 cycles.		non-magnetic panels and	
RANGE WATTS	RANGE VOLTS	MAX. AMPS				<b>MODEL 1379</b>	
0-75	150	1.0	—	—	—	10960*	\$34.92
0-150	150	2.0	—	—	—	10970*	34.92
0-300	150	4.0	—	—	—	10975*	34.92
0-750	150	10.0	—	—	—	10990*	34.92
0-600	300	4.0	—	—	—	10980*	37.47
0-1500	300	10.0	—	—	—	11000*	37.47
0-3000	300	20.0	—	—	—	11010*	37.47
<b>COMPENSATED WATTMETERS</b>							
0-10	300	.175	—	—	—	10930*	46.75
0-20	300	.400	—	—	—	10940*	46.75
0-30	300	.650	—	—	—	10950*	46.75

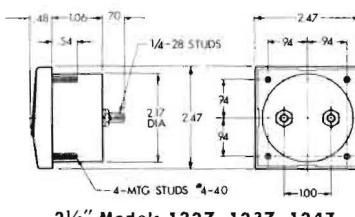
\*External Multipliers, Model 183 (Featured on back page) are furnished on AC meters having a range of 500 volts or higher. All others are self-contained.

†2½" AC ammeters are self-contained through 50 amps. 3½" and 4½" AC ammeters self-contained through 75 amps. Higher range AC ammeters are 5 amp meters to be used with external current transformer. See back page for current transformer listings.

•New Model additions.

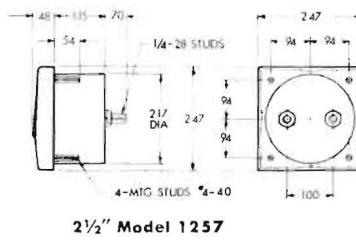


1½" Models 1212, 1214

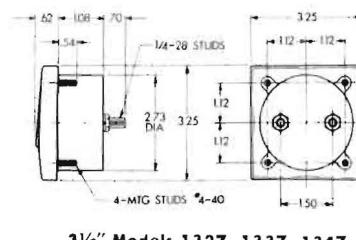


2½" Models 1227, 1237, 1247

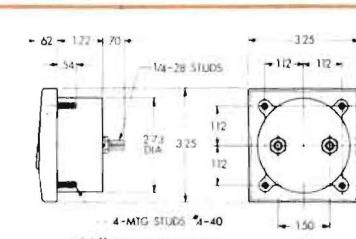
## DIMENSIONS



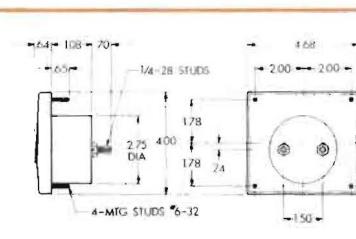
2½" Model 1257



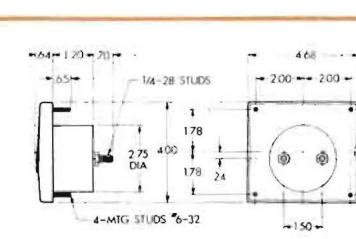
3½" Models 1327, 1337, 1347



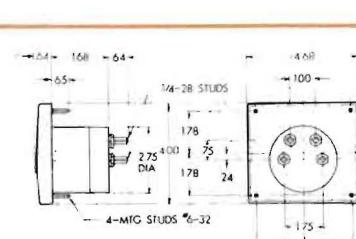
3½" Model 1357



4½" Models 1329, 1339, 1349



4½" Model 1359



4½" Model 1379

SIMPSON ELECTRIC CO. 5

# Simpson

## INSTRUMENTS THAT

### SIMPSON STOCK METER RANGES AND PRICES

CALIBRATION AND DIALS—All DC meters listed below have the Simpson External Magnet Type Movement calibrated for non-magnetic panel. When ordering external magnet DC meters to be used on steel panels, state panel thickness and add \$1.65 to list price shown below for re-calibration. As an accommodation, Simpson maintains a large supply of special dials that can be substituted for most dials listed on this page, add \$1.65 to list prices shown. Write to the factory for availability on special dials before ordering.

### 2½", 3½", 4½" • ROUND and • RECTANGULAR STOCK METERS



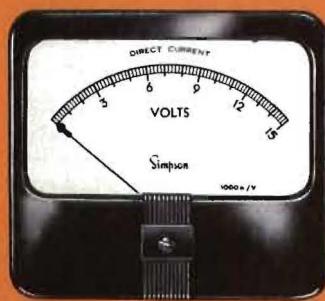
2½" Models 125, 155

3½" Models 25, 55



2½" Models 127, 157

3½" Models 27, 57



4½" Model 29

RANGE	RESISTANCE (Ohms)	2½"				3½"				4½"								
		CASE STYLES		CATALOG NOS.	PRICE	CASE STYLES		CATALOG NOS.	PRICE	CASE STYLES		CAT. NO.	PRICE					
MODELS		125	127			MODELS				MODELS								
<b>DC VOLTMETERS</b> External Magnet Meter Movement																		
0-1.5		8850	9020	\$13.05	7060	7290	\$13.50	7620	\$14.85									
0-3		8860	9030	13.05	7070	7300	13.50	7630	14.85									
0-5		8870	9040	13.05	7080	7310	13.50	7640	14.85									
0-8		8880	9050	13.05	7090	7320	13.50	7650	14.85									
0-10		8890	9060*	13.05	7100	7330*	13.50	7660	14.85									
0-15		8900	9080	13.05	7110	7350	13.50	7670	14.85									
0-25		8910	9090	13.05	7120	7360	13.50	7680	14.85									
0-30		8920	9100	13.05	7130	7370	13.50	7690	14.85									
0-50		8930	9110*	13.05	7140	7380*	13.50	7700	14.85									
0-100		8940	9130	13.05	7150	7400	13.50	7710	14.85									
0-150		8950	9140*	13.05	7160	7410*	13.50	7720	14.85									
0-200		8960	9160	13.05	7170	7430	13.50	7730	14.85									
0-250		8970	9170	13.05	7180	7440	13.50	7740	14.85									
0-300		8980	9180*	13.05	7190	7450*	13.50	7750	14.85									
0-500		8990	9200	13.80	7200	7470*	14.10	7760	15.30									
0-750		9000†	9210†	16.65	7210	7490	14.10	7770	15.30									
0-1000		9010†	9220†	16.95†	7220†	7495†	17.55	7780†	19.20									
0-1500		—	—	—	7230†	7520†	17.85	7790†	19.50									
0-2000		—	9225†	17.55†	7240†	7530†	18.15	7800†	19.80									
0-2500		—	—	—	7250†	7550†	18.45	7810†	20.10									
0-3000		9015†	—	18.15†	7260†	7560†	18.75	7820†	20.40									
0-4000		—	—	—	7270†	7580†	19.05	7830†	20.70									
0-5000		—	—	—	7280†	7600†	19.35	7840†	21.00									
<b>DC AMMETERS</b> External Magnet Meter Movement																		
0-1	.050	1460	1680	\$12.90	0005	0230	\$13.35	0450	\$14.70									
0-1.5	.033	1470	1690	12.90	0020	0240	13.35	0460	14.70									
0-2	.025	1480	1709	12.90	0030	0250	13.35	0470	14.70									
0-3	.0166	1490	1710	12.90	0040	0260	13.35	0480	14.70									
0-5	.010	1500	1720	12.90	0050	0270	13.35	0490	14.70									
0-10	.005	1510	1730	12.90	0060	0280	13.35	0500	14.70									
0-15	.0033	1520	1740	12.90	0070	0290	13.35	0512	14.70									
0-25	.0020	1530	1750	12.90	0080	0300	13.35	0520	14.70									
0-30	.0017	1540	1760	12.90	0090	0310	13.35	0530	14.70									
0-50	.001	1550	1770	12.90	0099	0320	13.35	0540	14.70									
0-75	10.0	1560†	1780†	12.45	0110†	0330†	12.90	0550†	14.40									
0-100	10.0	1570†	1790†	12.45	0120†	0340†	12.90	0560†	14.40									
0-150	10.0	1580†	1800†	12.45	0130†	0350†	12.90	0570†	14.40									
0-200	10.0	1590†	1810†	12.45	0140†	0360†	12.90	0580†	14.40									
0-250	10.0	1600†	1820†	12.45	0150†	0370†	12.90	0590†	14.40									
0-300	10.0	1610†	1830†	12.45	0160†	0380†	12.90	0600†	14.40									
0-500	10.0	1620	1840	12.45	0170†	0390†	12.90	0610†	14.40									
0-750	10.0	1630†	1850†	12.45	0177†	0400†	12.90	0620†	14.40									
0-1000	10.0	1640†	1860†	12.45	0188†	0410†	12.90	0630†	14.40									
15-0-15	.0033	1650	1870	13.20	0200	0420	13.65	0640	15.15									
30-0-30	.0017	1660	1880	13.20	0210	0430	13.65	0650	15.15									
50-0-50	.001	1670	1890	13.20	0220	0440	13.65	0660	15.15									

†External Multipliers, Model 183 are furnished on 2½" DC meters 750 volts or higher; and on 3½" and 4½" DC meters 1000 volts and higher. All others are self-contained.

†DC ammeters are self-contained for ranges up to and including 50 amperes. Higher range DC ammeters (50MV) listed above can be supplied with external shunts and include 5 foot leads.

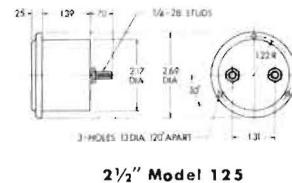
**SEE YOUR ELECTRONIC DISTRIBUTOR FOR YOUR PANEL METER AND TEST EQUIPMENT REQUIREMENTS.**

# STAY ACCURATE

## DIMENSIONS

### SPECIFICATIONS

SIZE	MODEL NUMBER	ACCURACY	SCALE LENGTH
2½"	125, 127		1.8" (45.7 mm)
3½"	25, 27	±2% of full scale	2.5" (63.7 mm)
4½"	29		3.9" (99.0 mm)



2½" Model 125

RANGE	RESISTANCE (Ohms)	2½" CASE STYLES			3½" CASE STYLES			4½" CASE STYLES			
		CATALOG NOS.	PRICE	MODELS	CATALOG NOS.	PRICE	MODELS	CAT. NO.	PRICE		
<b>DC MILLIAMMETERS</b>											
External Magnet Meter Movement											
0-1	46	5580	5760*	12.15	4610	4790*	12.75	5070	\$13.95		
0-1.5	46	5590	5780	12.15	4620	4810	12.75	5080	13.95		
0-3	46	5600	5790	12.15	4630	4820	12.75	5090	13.95		
0-5	23	5610	5800	12.15	4640	4830	12.75	5100	13.95		
0-10	2.2	5620	5810*	12.15	4650	4840*	12.75	5110	13.95		
0-15	2.2	5630	5830*	12.15	4660	4860*	12.75	5120	13.95		
0-20	2.2	5640	5850	12.15	4670	4880	12.75	5130	13.95		
0-25	6.0	5650	5860*	12.90	4680	4890*	13.35	5140	14.85		
0-50	3.0	5660	5880*	12.90	4690	4910*	13.35	5150	14.85		
0-75	2.0	5670	5900	12.90	4700	4930	13.35	5160	14.85		
0-100	1.5	5680	5910*	12.90	4710	4940*	13.35	5170	14.85		
0-150	1.0	5690	5930*	12.90	4720	4960*	13.35	5180	14.85		
0-200	.75	5700	5940*	12.90	4730	4980*	13.35	5190	14.85		
0-250	.60	5710	5960	12.90	4740	5000	13.35	5200	14.85		
0-300	.50	5720	5970*	12.90	4750	5010*	13.35	5210	14.85		
0-500	.30	5730	5990*	12.90	4760	5030*	13.35	5220	14.85		
0-750	.20	5740	6010	12.90	4770	5050	13.35	5230	14.85		
0-1000	.05	5750	6020	12.90	4780	5060	13.35	5240	14.85		
<b>DC MICROAMMETERS</b>											
External Magnet Meter Movement											
0-15†	4500	—	—	—	3740	3840	\$22.95	3940	\$25.05		
0-25††	2200	4200	4250	\$19.65	3750	3850	20.55	3950	22.65		
0-50	2000	4210	4260	17.10	3760	3860	17.55	3960	18.90		
0-100	2000	4220	4270	14.85	3770	3870	15.45	3970	17.25		
0-200	1000	4230	4280	13.20	3780	3880	13.95	3980	15.45		
0-500	200	4240	4281	12.75	3790	3890	13.35	3990	14.85		
25-0-25	2000	4192	4243	17.35	3800	3900	17.70	4000	19.05		
50-0-50	2000	4194	4245	15.00	3810	3910	15.60	4010	17.40		
100-0-100	1000	4196	4247	12.90	3820	3920	14.10	4020	15.75		
500-0-500	46	4198	4249	12.30	3830	3930	12.90	4030	14.10		
<b>DC MILLIVOLTMETERS</b>											
External Magnet Meter Movement											
0-50	10	6970	6990	\$12.45	6910	6930	\$12.90	6950	\$14.40		
0-100	20	6980	7000	12.45	6920	6940	12.90	6960	14.40		

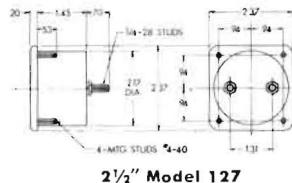
\*These 2½" and 3½" rectangular instruments are also carried in stock with lucite illuminated dials. Supplied complete with socket and 6 volt bulb, for an additional cost of \$3.45 dealer's net.

†These meters use the Hi Flux magnet and cannot be recalibrated for use on steel panels.

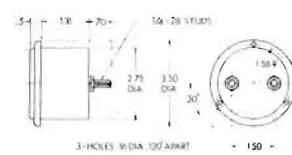
††The Model 29 meters in this range use the Hi Flux magnet and cannot be recalibrated for use on steel panels.

SEE GLOSSARY OF TERMS, PAGES 17, 18 AND 19.

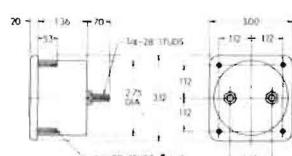
SIMPSON ELECTRIC COMPANY 7



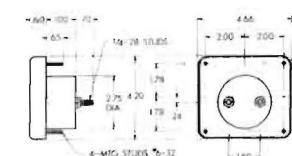
2½" Model 127



3½" Model 25



3½" Model 27



4½" Model 29

**Simpson**

**2½", 3½", 4½"**

- **ROUND and**
- **RECTANGULAR**
- PANEL METERS**



2½" Models 125, 135, 155, 175  
3½" Models 25, 35, 55, 75

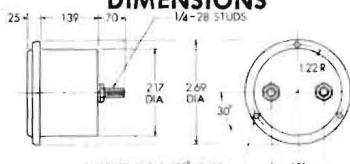


2½" Models 127, 137, 157, 177  
3½" Models 27, 37, 57, 77

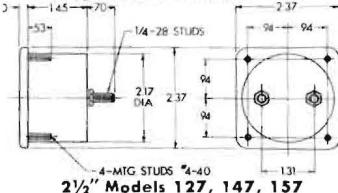


4½" Models 29, 39, 59, 79

**DIMENSIONS**



2½" Models 125, 145, 155



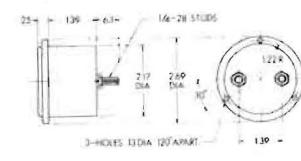
2½" Models 127, 147, 157

**SIMPSON STOCK METER RANGES AND PRICES**

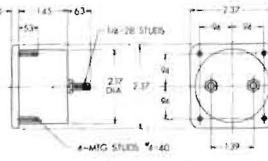
**CALIBRATION AND DIALS**—All DC meters listed below have the Simpson External Type Movement calibrated for non-magnetic panel. All AC meters have the Simpson Iron Vane type movement. AC Milliammeters and Ammeters, except 0-10 amps, are calibrated for use on 25 through 800 cps; 0-10 AC Ammeters and all AC Voltmeters are calibrated for use on 25 through 125 cps. Wattmeters listed below have the Simpson dynamometer movement calibrated for either magnetic or non-magnetic panels and for a frequency range of 25-125 cycles. When ordering external magnet DC meters to be used on steel panels, state panel thickness and add \$1.65 to list price shown below for re-calibration. On AC iron vane voltmeters for use on other than 25-125 cps, specify frequency and add \$1.65 to list prices shown below. As an accommodation, Simpson maintains a large supply of special dials that can be substituted for most dials listed on this page, add \$1.65 to list prices shown. Write to the factory for availability on special dials before ordering.

RANGE	APPROX. IMPEDANCE (Ohms) @ 60 cps	2½"		3½"		4½"								
		CASE STYLES CATALOG NOS. PRICE		CASE STYLES CATALOG NOS. PRICE		CASE STYLES CAT. NO. PRICE								
<b>RF AMMETERS</b>														
Internal Thermocouple Type														
0-1	.343	135	137	35	37	39								
0-1.5	.200	1901	1980*	14.10	670	750*	\$15.00							
0-2	.120	1910	2000	14.10	680	770	15.00							
0-2.5	.10	1920	2010*	14.10	690	780*	15.00							
0-3	.08	1930	2030	14.10	700	800	15.00							
0-4.5	.045	1940	2040*	14.10	710	810*	15.00							
0-8	.031	1950	2060*	14.10	720	830*	15.00							
0-10	.023	1960	2080	14.10	730	850	15.00							
		1970	2090	14.10	736	860	15.00							
<b>RF MILLIAMMETERS</b>														
±0-100 Linear Scale														
0-115	4.0	—	—	—	5250	5290	\$28.35							
0-150	4.5	—	—	—	5260	5300	18.00							
0-250	3.5	—	—	—	5270	5310	18.00							
0-500	.63	—	—	—	5280	5320	18.00							
<b>WATTMETERS</b>														
Dynamometer Type														
Single Phase														
Maximum														
Range	Volts	Amps	175	177	75	77	79							
0-75	150	1.0	10790	10860	\$26.25	10580	10650	\$27.60						
0-150	150	2.0	10800	10870	26.25	10590	10660	27.60						
0-300	150	4.0	10810	10880	26.25	10600	10670	27.60						
0-750	150	10.0	10830	10900	26.25	10620	10690	27.60						
0-600	300	4.0	10820	10890	28.65	10610	10680	30.00						
0-1500	300	10.0	10840	10910	28.65	10630	10700	30.00						
0-3000	300	20.0	10850	10920	28.65	10640	10710	30.00						
<b>COMPENSATED WATTMETERS</b>														
Single Phase														
Maximum														
Range	Volts	Amps	75	77	79									
0-10	300	.175	—	—	—	10642	\$44.10							
0-20	300	.400	—	—	—	10644	44.10							
0-20	500	.175	—	—	—	10646	44.10							
0-30	300	.650	—	—	—	10645	44.10							
0-30	500	.300	—	—	—	10648	44.10							
0-50	500	.500	—	—	—	10649	44.10							
<b>DC GALVANOMETERS</b>														
Scale														
Sensitivity														
Res.														
Micro-Amps. Ohms														
125	500-0-500	46	3670	3690	\$12.75	3630	3650	\$13.20						
125	750-0-75	2000	3660	3680	13.65	3620	3640	15.00						
25			25	27		3654		\$14.85						
27						3652		15.45						

\*These 2½" and 3½" rectangular instruments are also carried in stock with lucite illuminated dials. Supplied complete with socket and 6 volt bulb, for an additional cost of \$3.45 dealer's net.



2½" Model 135



3½" Model 137

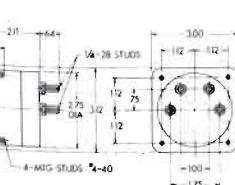
## SPECIFICATIONS

SIZE	MODEL NUMBER	ACCURACY	SCALE LENGTH
<b>2½"</b>	125, 127, 135, 137	±2% of full scale (Compensated wattmeters ±3%)	1.8" (45.7 mm)
	155, 157		1.6" (41.1 mm)
	175, 177		2.5" (63.7 mm)
	25, 27, 35, 37		2.3" (57.4 mm)
<b>3½"</b>	55, 57		3.8" (97 mm)
	75, 77		3.5" (89.0 mm)
	29, 39		
<b>4½"</b>	59		
	79		

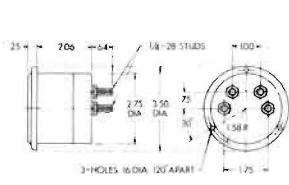
RANGE	APPROX. IMPEDANCE (Ohms) @ 60 cps	2½" CASE STYLES		3½" CASE STYLES		4½" CASE STYLES		
		CATALOG NOS.	PRICE	CATALOG NOS.	PRICE	CAT. NO.	PRICE	
<b>AC VOLTMETERS</b>								
Iron Vane Type Meter Movement								
0-1.5	3	9230	9370	\$11.70	8390	8530	\$12.45	
0-3	12	9240	9380	11.70	8400	8540	12.45	
0-5	33	9250	9390	11.70	8410	8550	12.45	
0-10	133	9260	9400*	11.70	8420	8566*	12.45	
0-15	300	9270	9420*	11.70	8430	8580*	12.45	
0-25	833	9280	9440	12.15	8440	8599	12.75	
0-50	3,333	9290	9450	12.15	8450	8610	12.75	
0-100	16,666	9300	9460	13.20	8460	8620	13.80	
0-150	25,000	9310	9470*	12.90	8470	8630*	13.65	
0-250	41,166	9320	9490	12.90	8480	8650	13.65	
0-300	50,000	9330	9500*	12.90	8490	8660*	13.65	
0-500	83,333	9340†	9520†	17.40	8500†	8680†	17.70	
0-750	125,000	9350†	9530†	19.20	8510†	8690†	19.35	
0-1000	166,666	9360†	9532†	20.70	8520†	8700†	20.85	
<b>AC AMMETERS</b>								
Iron Vane Type Meter Movement								
0-1	.287	2100	2270	\$11.55	950	1120	\$12.15	
0-1.5	.185	2110	2280	11.55	960	1130	12.15	
0-2	.115	2120	2290	11.55	970	1140	12.15	
0-3	.027	2130	2300	11.55	980	1145	12.15	
0-5	.012	2140	2310	11.55	990	1160	12.15	
0-10	.003	2150	2320	11.55	1001	1170	12.15	
0-15	.0022	2160	2330	11.55	1010	1180	12.15	
0-25	.0003	2170	2340	11.85	1020	1190	12.45	
0-30	.0003	2180	2350	11.85	1030	1200	12.45	
0-50	.0006	2190	2360	11.85	1040	1210	12.45	
0-75	.0005	—	—	—	3432	3434	13.20	
0-75	.012	2200†	2370†	11.55	1050†	1220†	12.15†	
0-100	.012	2210†	2380†	11.55	1060†	1230†	12.15†	
0-150	.012	2220†	2390†	11.55	1070†	1240†	12.15†	
0-200	.012	2230†	2400†	11.55	1080†	1250†	12.15†	
0-250	.012	2240†	2410†	11.55	1090†	1260†	12.15†	
0-300	.012	2250†	2420†	11.55	1100†	1270†	12.15†	
0-500	.012	2260†	2422†	11.55	1110†	1280†	12.15†	
<b>AC MILLIAMMETERS</b>								
Iron Vane Type Meter Movement								
0-10	2,000	6030	6100	\$11.55	5370	5440	\$12.15	
0-15	875	6040	6110	11.55	5380	5499	12.15	
0-25	390	6050	6120	11.55	5390	5460	12.15	
0-50	80	6060	6130	11.55	5400	5470	12.15	
0-100	20	6070	6140	11.55	5410	5480	12.15	
0-250	5	6080	6150	11.55	5420	5490	12.15	
0-500	.9	6090	6152	11.55	5430	5500	12.15	

\*External Multipliers, Model 183 (Featured on back page) are furnished AC on meters having a range of 500 volts or higher; on 2½" DC meters 750 volts or higher; and on 3½" and 4½" DC meters 1000 volts or higher. All others are self-contained.

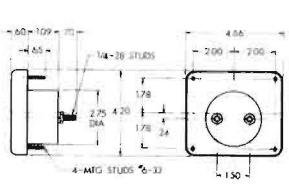
†2½" AC ammeters are self-contained through 50 amps. 3½" and 4½" AC ammeters self-contained through 75 amps. Higher range AC ammeters are 5 amp meters to be used with external current transformer. See listing on back cover.



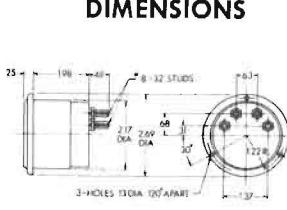
3½" Model 77



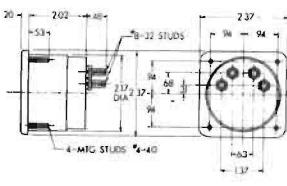
3½" Model 75



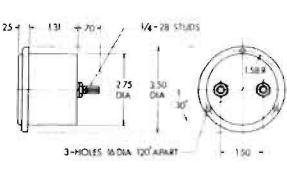
4½" Model 59



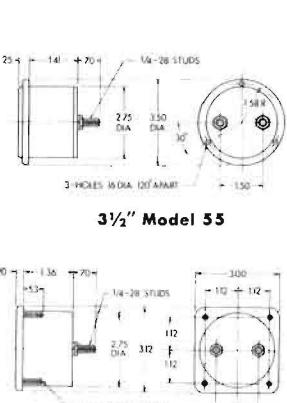
2½" Model 175



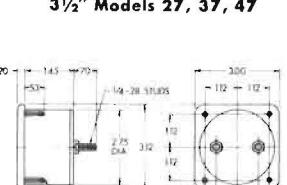
2½" Model 177



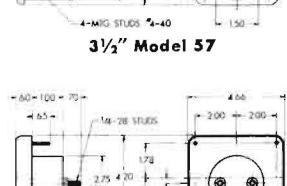
3½" Models 25, 35, 45



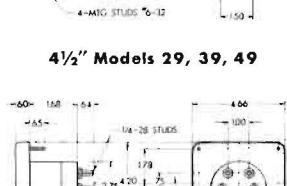
3½" Model 55



3½" Models 27, 37, 47



3½" Model 57



4½" Model 79

**Simpson**

INSTRUMENTS THAT STAY ACCURATE

**2½", 3½", 4½", 6"**

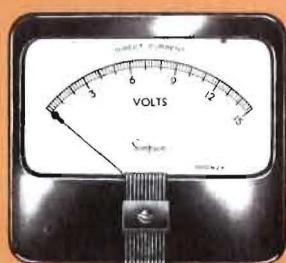
- **ROUND and**
- **RECTANGULAR**
- STOCK METERS**



2½" Model 145  
3½" Model 45



2½" Model 147  
3½" Model 47



4½" Model 49



6" Model 1150-1  
1% Meter supplied  
with Mirror Scale

### SIMPSON STOCK METER RANGES AND PRICES

**CALIBRATION AND DIALS**—DC meters have the Simpson self-shielding movement and may be used on either magnetic or non-magnetic panels. Rectifier type meters have the Simpson external magnet movement, calibrated for non-magnetic panel. When ordering external magnet meters to be used on steel panels, state panel thickness and add \$1.65 to list price shown below for re-calibration. As an accommodation, Simpson maintains a large supply of special dials that can be substituted for most dials listed on this page, add \$1.65 to list prices shown. Write to the factory for availability on special dials before ordering.

### SPECIFICATIONS

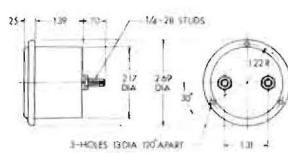
SIZE	MODEL NO.	ACCURACY	SCALE LENGTH
<b>2½"</b>	145, 147	DB and Rectifier type meters ± 3% of full scale @ 25°C. and 60 cycle sine wave	1.8" (45.7 mm)
<b>3½"</b>	45, 47	VU meters per ASA specifications	2.5" (63.7 mm)
<b>4½"</b>	49, 142		3.8" (97 mm)
<b>6"</b>	1150, 1150-1	± 2% of full scale ± 1% of full scale, mirrored scale	4.6" (114.8 mm)

RANGE	RESISTANCE (Ohms)	2½" CASE STYLES		3½" CASE STYLES		4½" CASE STYLE	
		CATALOG NOS.	PRICE	CATALOG NOS.	PRICE	CAT. NO.	PRICE
<b>AC VOLTMETERS</b> Rectifier Type							
0-1		—	—	7940	8120	\$18.75	8300 \$20.55
0-3		—	—	7950	8130	18.75	8310 20.55
0-5		—	—	7960	8140	18.75	8320 20.55
0-10	2000 ohms per volt	—	—	7970	8150	18.75	8330 20.55
0-15		—	—	7980	8160	18.75	8340 20.55
0-50		—	—	7990	8170	18.75	8350 20.55
0-100		—	—	8000	8180	18.75	8360 20.55
0-150		—	—	8010	8190	18.75	8370 20.55
0-300		—	—	8020	8200	18.75	8371 20.55
<b>AC MILLIAMMETERS</b> Rectifier Type							
0-1	600	—	—	6820	6850	\$18.00	6880 \$19.50
0-2	400	—	—	6830	6860	18.00	6890 19.50
0-5	200	—	—	6840	6870	18.00	6900 19.50
<b>AC MICROAMMETERS</b> Rectifier Type							
0-100	3400	—	—	4080	4120	\$20.55	4160 \$22.05
0-200	2400	—	—	4090	4130	18.15	4170 19.80
0-300	1800	—	—	4100	4140	18.00	4180 19.50
0-500	1200	—	—	4110	4150	17.70	4190 19.20
<b>Volume Level Indicators</b> <b>DECIBEL METERS</b> Zero Power Level 6 MW 500 Ohm Line							
145	147	MODELS	45	47	MODELS	49	MODELS
3470	3480	\$18.30	3440	3450	\$18.45	3460	\$20.10
<b>GENERAL PURPOSE TYPE</b> —10 to +6 db 5000 ohms							
<b>HIGH SPEED TYPE</b> —10 to +6 db 5000 ohms							
<b>LOW SPEED TYPE</b> —10 to +6 db 5000 ohms							
3490	3500	20.40	3510	3520	20.25	3540	21.15
<b>Volume Level Indicators</b> <b>VU METERS</b> † Reference Level 1 MW 600 Ohm Line							
10440	10450	\$22.35	10460	10470	\$24.15	10530	24.15
10510	10520	22.35	10540	10550	26.70	10560	26.70
<b>"A" SCALE; Not Illuminated</b>							
<b>"B" SCALE; Not Illuminated</b>							
<b>"A" SCALE; Illuminated</b>							
<b>"B" SCALE; Illuminated</b>							

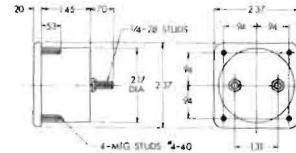
†Simpson VU meters meet all the Electrical and Ballistic specifications established by Bell Laboratories and American Standards Association as required by broadcasting, communication and sound engineers. They are available with either type A or B scales. Type A scale stresses the level in VU for monitoring wire lines. Type B scale stresses per cent use of transmitter output and is the standard for broadcast service.

†Scale: 3900 ohms.

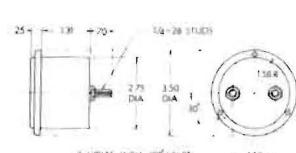
## DIMENSIONS



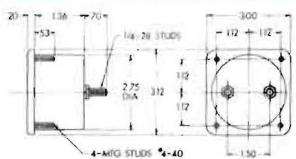
2 1/2" Model 145



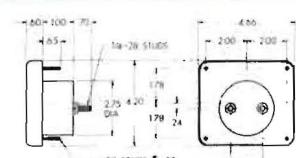
2 1/2" Model 147



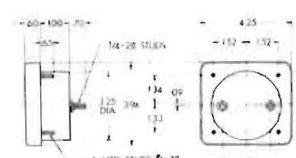
3 1/2" Model 45



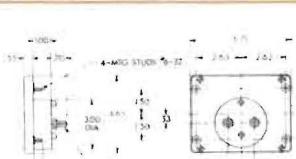
3 1/2" Model 47



4 1/2" Model 49



4 1/2" Model 142



6" Model 1150

## 6" RECTANGULAR CASE STYLE—MODELS 1150 1% and 2% Tolerance

RANGE	RESISTANCE (Ohms)	CAT. NO.	PRICE	RANGE	RESISTANCE (Ohms)	CAT. NO.	PRICE
<b>DC VOLTMETERS</b> 2%		<b>MODEL 1150</b>		<b>DC MILLIAMMETERS</b> 2%		<b>MODEL 1150</b>	
0-10		9533	\$18.90	0-1	46	6153	\$18.90
0-25	1000 OHMS	9534	18.90	0-10	10	6154	18.90
0-50		9535	18.90	0-50	2.0	6155	18.90
0-100	PER VOLT	9536	18.90	0-100	1.0	6156	18.90
0-150		9537	18.90	0-500	.2	6157	18.90
0-300		9538	18.90				
0-500	2000 $\Omega$ /V	9539	19.50				
<b>DC MILLIVOLTMETERS</b> 2%		<b>MODEL 1150</b>		<b>DC MILLIAMMETERS</b> 1% Mirrored Scale		<b>MODEL 1150-1</b>	
0-50	10	7003	\$19.65	0-1	46	6158	\$23.85
				0-100	1.0	6161	23.85
				0-500	.2	6162	23.85
<b>DC AMMETERS</b> 2%		<b>MODEL 1150</b>		<b>DC MICROAMMETERS</b> 2%		<b>MODEL 1150</b>	
0-1	.050	2424	\$19.65	0-15	5500	4282	\$29.95
0-5	.010	2425	19.65	0-25	5500	4283	26.85
0-10	.005	2426	19.65	0-50	5000	4284	24.45
0-15	.0033	2427	19.65	0-100	2800	4285	23.40
0-25	.0020	2428	19.65	0-200	1200	4286†	20.40
0-30	.0016	2429	19.65	0-300	200	4287†	19.80
0-50	.001	2430	19.65				
<b>DC MICROAMMETERS</b> 1% Mirrored Scale		<b>MODEL 1150-1</b>		<b>DC MICROAMMETERS</b> 1% Mirrored Scale		<b>MODEL 1150-1</b>	
0-50		5000	4290	0-50	5000	4290	\$29.40
0-100		2800	4291	0-100	2800	4291	28.35
0-200		1200	4292	0-200	1200	4292	25.35
0-500		200	4293	0-500	200	4293	24.75

## 3 1/2" ELAPSED TIME PANEL METERS

Widely used by research labs, manufacturing plants, broadcasting stations . . . to keep life and performance records based on operating time. These meters use self-starting synchronous clock motors. They indicate up to 99999.9, then recycle and begin again at 00000.0.

Molded bakelite case similar to the Simpson 3 1/2" rectangular and round meters. Case depth—2 1/8".

RANGE	MODEL 55ET CAT. NO.	PRICE	MODEL 57ET CAT. NO.	PRICE
120V-60 cps	3580	\$18.85	3590	\$18.85
240V-60 cps	3600	19.15	3610	19.15



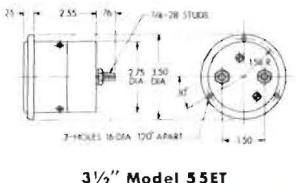
3 1/2" Model 55ET



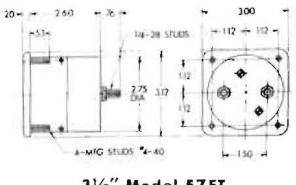
3 1/2" Model 57ET

MANUFACTURERS OF THE WORLD FAMOUS 260°

SIMPSON ELECTRIC COMPANY

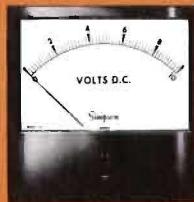


3 1/2" Model 55ET



3 1/2" Model 57ET

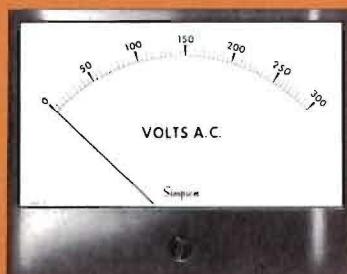
**"RUGGED SEAL"**  
**3½", 4½", 4" x 6"**  
**• SQUARE**  
**• RECTANGULAR**  
**STOCK METERS**



3½" Models 3323, 3383

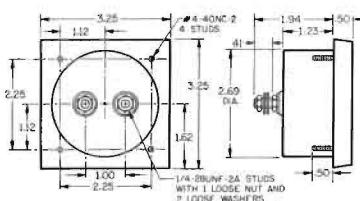


4½" Models 3324, 3384



4" x 6" Models 3326, 3386

**DIMENSIONS**



3½" Models 3323, 3343

4½" Models 3324, 3344

**NEW SIMPSON "RUGGED SEAL" PANEL METERS**

This new line of metal cased panel instruments is ideal for use in field test equipment or wherever rigorous environmental conditions are encountered. They are completely sealed, commercially ruggedized, glass window, metal cased and shielded, not affected by steel panel mounting.

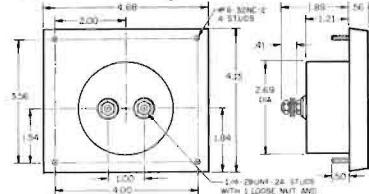
**SPECIFICATIONS**

SIZE	MODEL NO.	ACCURACY	SCALE LENGTH
3½"	3323, 3343*	DC METERS: $\pm 2\%$ F. S. AC METERS: $\pm 2\%$ F. S. (@ 25° and 60 cps. Sine Wave)	2.9" (74 mm)
4½"	3324, 3344*		3.9" (101 mm)
4" x 6"	3326, 3346*		4.7" (120 mm)

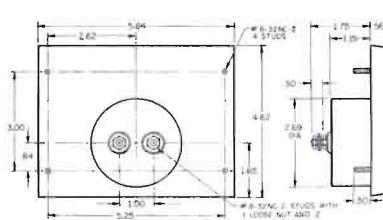
All AC Meters are rectifier type. AC Voltmeters, Milliammeters and Microammeters maintain their rated accuracy over a range of 25 through 2500 cps. AC Ammeters maintain their accuracy over a range of 55 through 125 cps.

RANGE	APPROX. RESISTANCE (Ohms)	3½"		4½"		4" x 6"	
		CASE STYLE	CAT. NO.	CASE STYLE	CAT. NO.	CASE STYLE	CAT. NO.
<b>DC VOLTMETERS</b> SHIELDED CASE External Magnet Movement							
0-1.5		MODEL	3323	MODEL	3324	MODEL	3326
0-10	1000 OHMS	16000*	\$17.10	16095*	\$18.60	16190*	\$20.40
0-15		16005*	17.10	16100*	18.60	16195*	20.40
0-25		16010*	17.10	16105*	18.60	16200*	20.40
0-50	PER VOLT	16015*	17.10	16110*	18.60	16205*	20.40
0-100		16020*	17.10	16115*	18.60	16210*	20.40
0-500		16025*	17.10	16120*	18.60	16215*	20.40
		16030*	17.10	16125*	18.60	16220*	20.40
<b>DC AMMETERS</b> SHIELDED CASE External Magnet Movement							
0-5		MODEL	3323	MODEL	3324	MODEL	3326
0-10	INTERNAL SHUNT 75 MV MAX.	16035*	\$17.40	16130*	\$18.90	16225*	\$21.00
		16040*	17.40	16135*	18.90	16230*	21.00
<b>DC MILLIAMMETERS</b> SHIELDED CASE External Magnet Movement							
0-1		MODEL	3323	MODEL	3324	MODEL	3326
0-100	.80Ω .5Ω	16045*	\$16.50	16140*	\$18.00	16235*	\$19.95
		16050*	17.40	16145*	18.90	16240*	21.00
<b>DC MICROAMMETERS</b> SHIELDED CASE External Magnet Movement							
0-50		MODEL	3323	MODEL	3324	MODEL	3326
0-100	3000Ω 1300Ω	16055*	\$22.20	16150*	\$23.70	16245*	\$25.95
		16060*	20.10	16155*	21.60	16250*	24.00
<b>AC VOLTMETERS (Rectifier Type)</b> SHIELDED CASE External Magnet Movement							
0-150		MODEL	3343	MODEL	3344	MODEL	3346
0-300	1000 OHMS PER VOLT	16065*	\$20.70	16160*	\$21.90	16255*	\$24.00
		16070*	20.70	16165*	21.90	16260*	24.00
<b>AC AMMETERS (Rectifier Type)</b> SHIELDED CASE External Magnet Movement							
0-1	Internal Transformer Burden.	MODEL	3343	MODEL	3344	MODEL	3346
0-5	0.5 VA Maximum	16075*	\$25.80	16170*	\$27.00	16265*	\$29.10
		16080*	25.80	16175*	27.00	16270*	29.10
<b>AC MILLIAMMETERS (Rectifier Type)</b> SHIELDED CASE External Magnet Movement							
0-1		MODEL	3343	MODEL	3344	MODEL	3346
600Ω		16085*	\$20.40	16180*	\$21.60	16275*	\$23.40
<b>AC MICROAMMETERS (Rectifier Type)</b> SHIELDED CASE External Magnet Movement							
0-100		MODEL	3343	MODEL	3344	MODEL	3346
4000Ω		16090*	\$21.60	16185*	\$22.50	16280*	\$24.60

\*New addition to catalog.

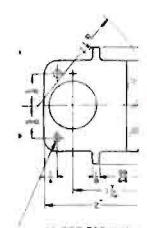


3½" Models 3323, 3343



4" x 6" Models 3326, 3346

**1½", 2" PANEL**



RANGE	DC VOLTMETER
0-15	Self-S. Meter
0-25	
0-50	
0-100	
0-150	
0-200	
0-300	
0-500	

DC MILLIAMMETER
Self-S. Meter
0-1
0-5
0-10
0-15
0-25
0-50
0-100
0-150
0-200
0-250
0-300
0-500

DC AMMETER
Self-S. Meter
0-1
0-5
0-10
0-15
0-25
0-50
0-100
0-150
0-200
0-250
0-300
0-500

## 1½", 2½" EDGEWISE PANEL METERS



### INSTRUMENTS THAT STAY ACCURATE

Where your panel design calls for making every square inch count . . . or where saving weight is important, these new Simpson Edgewise Meters solve many design problems.

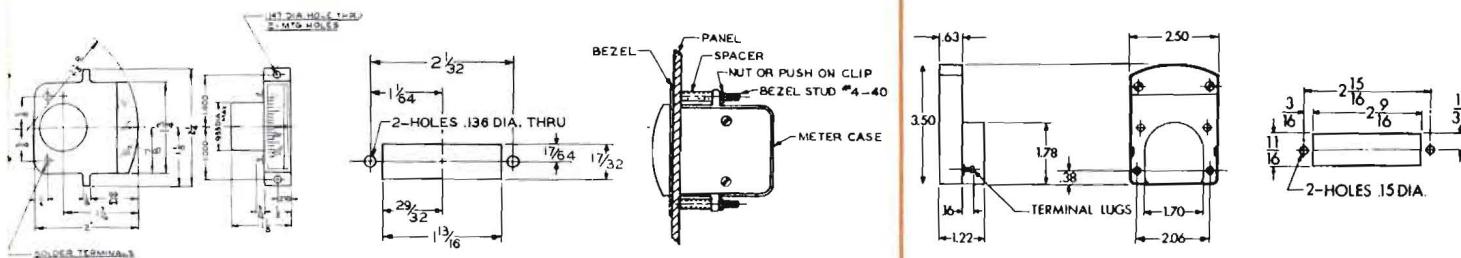
Edgewise Meters are supplied complete with mounting hardware, including Bezel with two nuts for quick, simple mounting.

- Self-Shielded Meter Movement.
- Require only  $\frac{1}{2}$  the panel area of a conventional 2½" Meter.
- Scale length comparable to a 2½" Meter.
- Accurate comparative readings by mounting Meters next to each other.

### SPECIFICATIONS

**Accuracy**—DC  $\pm 2\%$  of full scale.  
**AC Rectifier Type**  $\pm 3\%$  of full scale.  
 $\text{@ } 25^\circ \text{ and 60 cycle Sine Wave.}$   
**Types**—Direct current—AC Rectifier.  
 1½"—1¾" Scale length  
 2½"—1½" Scale length

**Case**—Dustproof, molded acrylic.  
**Standard Scale**—Black numbers on a white background.  
**Terminals**—Solder (ammeters—stud type).  
**Weight**—approximately 5 ounces.



RANGE	APPROX. RESISTANCE (Ohms)	1½" CASE STYLE		2½" CASE STYLE	
		CAT. NO.	PRICE	CAT. NO.	PRICE
<b>DC VOLTMETERS</b> Self-Shielding Meter Movement					
0	1000 $\Omega$ /volt	10354	\$13.95	10360	\$15.00
0-15	1000 $\Omega$ /volt	10355	13.95	10370	15.00
0-25	1000 $\Omega$ /volt	10356	13.95	10375	15.00
0-50	1000 $\Omega$ /volt	10357	13.95	10380	15.00
0-100	1000 $\Omega$ /volt	—	—	10385	15.00
0-150	1000 $\Omega$ /volt	10358	13.95	10390	15.00
0-300	1000 $\Omega$ /volt	—	—	10400	15.00
0-500	2000 $\Omega$ /volt	10359	14.10	10410	15.15

DC MILLIAMMETERS		MODEL 1521		MODEL 1522	
0-1	20	6811	\$13.80	6710	\$14.85
0-5	2.5	6812	13.80	6720	14.85
0-10	13.5	—	—	6730	14.85
0-15	9.0	—	—	6735	14.85
0-25	5.4	6815	14.40	6740	15.45
0-50	2.7	6816	14.40	6750	15.45
0-100	1.35	6817	14.40	6760	15.45
0-150	.9	—	—	6770	15.45
0-200	.675	6818	14.40	6780	15.45
0-250	.54	—	—	6790	15.45
0-300	.45	—	—	6800	15.45
0-500	.27	6819	14.40	6810	15.45

DC AMMETERS		MODEL 1521		MODEL 1522	
0-1	.050	—	—	3387	\$15.75
0-5	.010	—	—	3390	15.75
0-10	.005	—	—	3400	15.75
0-15	.0033	—	—	3410	15.75
0-25	.002	—	—	3420	15.75
0-50	.001	—	—	3430	15.75

RANGE	APPROX. RESISTANCE (Ohms)	1½" CASE STYLE		2½" CASE STYLE	
		CAT. NO.	PRICE	CAT. NO.	PRICE
<b>DC MILLIVOLTMETERS</b> Self-Shielding Meter Movement					
0-50	10 $\Omega$	0713	\$14.70	070110	\$15.75

RANGE	APPROX. RESISTANCE (Ohms)	1½" CASE STYLE		2½" CASE STYLE	
		CAT. NO.	PRICE	CAT. NO.	PRICE
<b>DC MICROAMMETERS</b> Self-Shielding Meter Movement					
0-25	3150	4552	\$21.15	4560	\$22.20
0-50	1800	4553	18.45	4570	19.50
0-100	1100	4554	16.35	4580	17.40
0-200	290	4555	14.70	4590	15.75
0-500	90	4556	14.25	4600	15.30

VOLUME LEVEL INDICATORS	VU METERS	MODEL 1521		MODEL 1522	
		CAT. NO.	PRICE	CAT. NO.	PRICE
"A" SCALE	—	—	—	10500	\$24.75
"B" SCALE	—	—	—	10570	24.75

AC VOLTMETERS	Rectifier Type Self-Shielding Meter Movement	MODEL 1541		MODEL 1542	
		CAT. NO.	PRICE	CAT. NO.	PRICE
0-150	1000 $\Omega$ /volt	10415	\$18.15	10420	\$19.20
0-300	1000 $\Omega$ /volt	—	—	10430	19.20

**Simpson**

SIMPSON ELECTRIC COMPANY

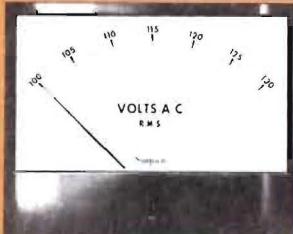
## RUGGED-SEAL SEGMENTAL STOCK METERS



2 1/2", 3 1/2", 4 1/2" Models



3 1/2", 4 1/2" Models



4" x 6" Models

### WIDE-VUE AND BAKELITE SEGMENTAL VOLTMETERS Single, Multi-Range



3 1/2" Model 1347



MULTI-RANGE 4 1/2" Model 1349



4 1/2" Model 49

### SIMPSON AVERAGE SENSING, TRUE RMS and DC PANEL INSTRUMENTS

Segmental Voltmeters and frequency meters make it possible to measure very small changes in input conditions.

The significant portion of the overall voltage or frequency range is expanded to occupy the full scale length, thus only that segment of the range that is important appears. In addition to the standard expansions and accuracies shown, special segmental voltmeters can be built on order. Write the factory for a quotation.

The A.C. segmental voltmeters are available in either average sensing or true R.M.S. sensing units. When working with sine wave currents or when other measurements will be made with average sensing equipment, the average sensing meters are preferred.

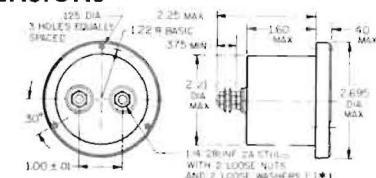
When working with distorted waveforms, as would be encountered in constant voltage transformers, S.C.R. circuits, D.C. to A.C. solid state inverters or similar equipment, the true R.M.S. sensing meter would probably be preferred.

#### GENERAL SPECIFICATIONS

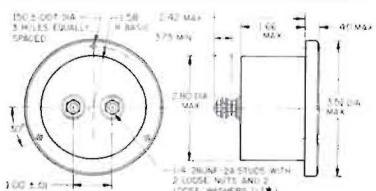
WIDE-VUE and BAKELITE CASE STYLES		RUGGED-SEAL and RUGGEDIZED METAL CASE STYLES			
AVERAGE SENSING AC SEGMENTAL VOLTMETERS		RMS SENSING AC SEGMENTAL VOLTMETERS		DC SEGMENTAL VOLTMETERS	FREQUENCY METERS
RANGE	100-130 AC Volts	100-130 200-260 400-520	100-130 AC Volts	105-125 AC Volts	110-120 AC Volts
ACCURACY (% OF CENTER SCALE VALUE)	±.5%	100-130 ±.5% 200-260 ±.75% 400-520 ±.75%	± 1.0%	±.5%	±.3%
FREQUENCY RANGE	20-2000 CPS	50-1000 CPS	55-550 CPS		—
CENTER SCALE VALUE	115 Volts	115/230/460 Volts	115 Volts	115 Volts	27 Volts
SENSITIVITY OR POWER CONSUMPTION	.6 to 1.3 VA (Sensitivity decreases as input voltage increases)		50 OPV	65 OPV	80 OPV
MAX. INPUT VOLTAGE (10 SECONDS)	150 Volts RMS	150/300/600 Volts RMS	150 Volts RMS		40 Volts
SQUARE WAVE WAVEFORM INFLUENCE	11%		2.5%	2.0%	1.0%
TRIANGULAR WAVE	5%		1.2%	.6%	.3%
MOVEMENT TYPE	Self Shielding		Shielded External Magnet		

\*Supplied with external potential transformer

#### DIMENSIONS

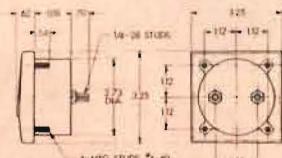


2 1/2" Model 3222

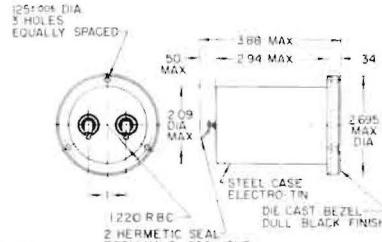


3 1/2" Model 3223

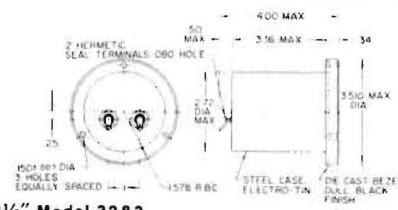
#### WIDE-VUE and BAKELITE



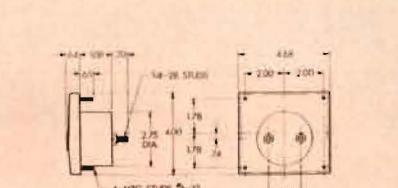
3 1/2" Model 1347



2 1/2" Model 3282



3 1/2" Model 3283



4 1/2" Model 1349

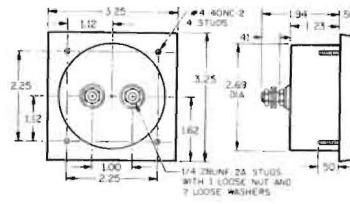
External Po  
Transformer

# STOCK PANEL METER RANGES AND PRICES

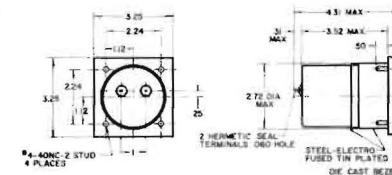
## ROUND RUGGEDIZED SEGMENTAL PANEL METERS

ROUND PANEL METERS			2 1/2"	3 1/2"	4 1/2"
Range	Center Scale Value	Accuracy	CASE STYLE CAT. NO.	CASE STYLE CAT. NO.	CASE STYLE CAT. NO.
<b>AC VOLTMETERS</b>			<b>MODEL 3282</b>	<b>MODEL 3283</b>	<b>MODEL 3284</b>
100-130	115V	1.0%	16285• \$ 70.00	16305• \$ 64.50	16335• \$ 71.50
105-125	115V	0.5%	16290• 70.00	16310• 64.50	16340• 71.50
110-120	115V	0.3%	16295• 70.00	16315• 64.50	16345• 71.50
<b>DC VOLTMETERS</b>			<b>MODEL 3222</b>	<b>MODEL 3223</b>	<b>MODEL 3224</b>
24-30	27V	0.5%	16300• \$ 60.00	16320• \$ 54.60	16350• \$ 61.50
<b>FREQUENCY METERS†</b>				<b>MODEL 3283</b>	<b>MODEL 3284</b>
cps	cps	0.25%	—	16325• \$ 152.50	16355• \$ 159.50
380-420	400	0.25%	—	16330• 152.50	16360• 159.50

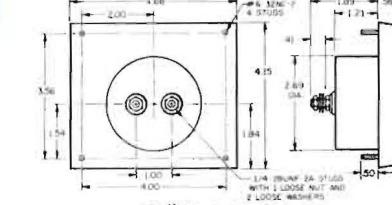
## DIMENSIONS



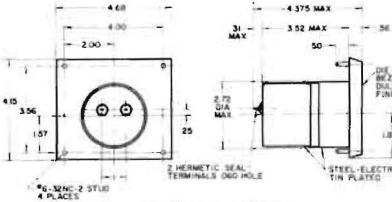
3 1/2" Model 3323



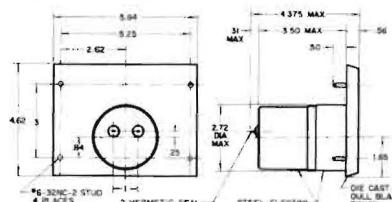
3 1/2" Model 3383



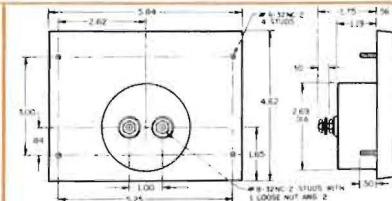
4 1/2" Model 3324



4 1/2" Model 3384



4" x 6" Model 3326



4" x 6" Model 3386

## SQUARE RUGGED-SEAL SEGMENTAL PANEL METERS

SQUARE PANEL METERS			3 1/2"	4 1/2"	4" x 6"
Range	Center Scale Value	Accuracy	CASE STYLE CAT. NO.	CASE STYLE CAT. NO.	CASE STYLE CAT. NO.
<b>AC VOLTMETERS</b>			<b>MODEL 3383</b>	<b>MODEL 3384</b>	<b>MODEL 3386</b>
100-130	115V	1.0%	16365• \$ 59.00	16395• \$ 65.00	16425• \$ 69.50
105-125	115V	0.5%	16370• 59.00	16400• 65.00	16430• 69.50
110-120	115V	0.3%	16375• 59.00	16405• 65.00	16435• 69.50
<b>DC VOLTMETERS</b>			<b>MODEL 3323</b>	<b>MODEL 3324</b>	<b>MODEL 3326</b>
24-30	27V	0.5%	16380• \$ 49.20	16410• \$ 55.20	16440• \$ 59.40
<b>FREQUENCY METERS†</b>			<b>MODEL 3383</b>	<b>MODEL 3384</b>	<b>MODEL 3386</b>
cps	cps	0.25%	16385• \$ 148.25	16415• \$ 153.00	16445• \$ 157.50
380-420	400	0.25%	16390• 148.25	16420• 153.00	16450• 157.50

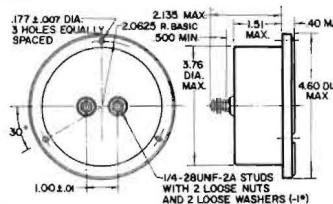
## BAKELITE SEGMENTAL PANEL METERS • Single, Multi-Range

AC VOLTMETERS			3 1/2"	4 1/2"	
Range	Center Scale Value	Accuracy	CASE STYLE CAT. NO.	CASE STYLES CAT. NO.	CASE STYLES CAT. NO.
100-130	115 V	.5%	10152 \$ 40.80	10155 \$ 40.95	10151 \$ 40.50
100-130	115 V	.5%	—	10157• \$ 50.60	—
200-260	230 V	.75%	—	—	—
400-520	460 V	.75%	—	—	—

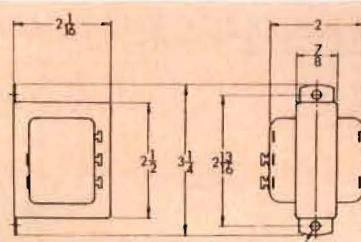
\*Accuracy is in percent of center scale value.

†Frequency meters are checked @ the center scale frequency @ 25°C and 115 volts sine wave after 30 minute warmup. Accuracy after 1.0 minute warmup is 1.0%. At end scale indications, maximum error will be 0.5%.

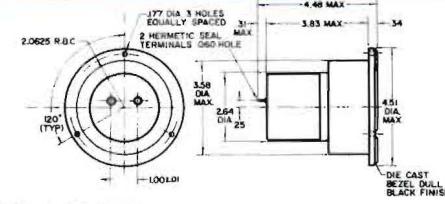
### • NEW MODEL ADDITION



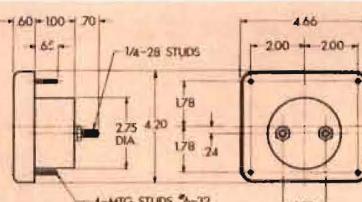
4 1/2" Model 3224



External Potential Transformer



4 1/2" Model 3284



4 1/2" Model 49

**Simpson**

SIMPSON ELECTRIC CO. 15

# METER RELAYS

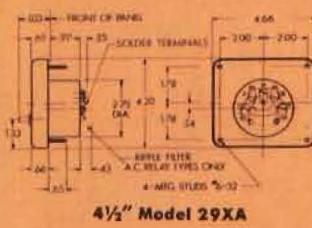
## Contact and Contactless Types

### 4½"

#### DIMENSIONS



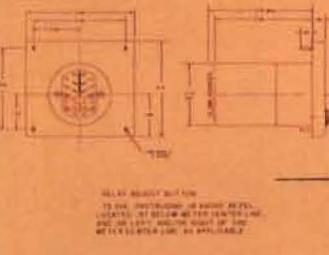
Contact Type  
4½" Model 29XA



4½" Model 29XA



Contactless Type  
4½" Model 3324XA



4½" Model 3324XA

## SIMPSON CONTACT OR CONTACTLESS TYPE METER RELAYS—SINGLE OR DUAL CONTROL

Simpson supplies both contact-making and contactless relays that are suitable for alarm, control or limit applications on equipment designed for unattended operation.

### CONTACT TYPE—MODEL 29XA

Contact making types are well suited to most general purpose applications in which cost and reasonable reliability are primary considerations. The contacts are the non-locking type and may be positioned along the scale arc by an external, front adjusted gear drive. Styling and mounting dimensions are designated as the Model 29XA.

#### SPECIFICATIONS

**GENERAL:** Model 29XA Relays are of the D'Arsonval Type. Externally adjusted limit setting contacts are non-locking and intended for circuits with external locking provisions or for light duty non-locking applications.

**CALIBRATION:** Accuracies  $\pm 2\%$  of full scale.

**CONTACTS:** Gold Alloy. For use @ 15 volts DC, 10 milliamperes maximum, on resistive or diode protected inductive loads.

**CONTACT ADJUSTMENT:** Contacts are externally adjustable over 95° of 100° scale arc, and within 5° of each other. The pointer will indicate the contact make position within 2° of actual contact intercept.

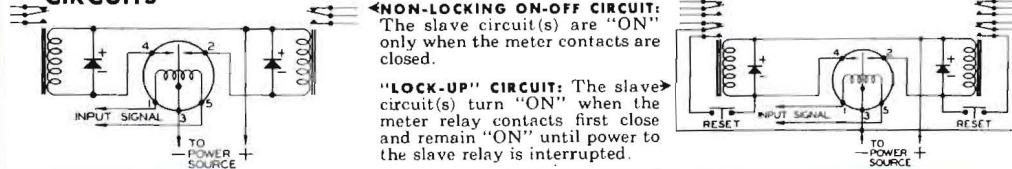
**CONTACT DIFFERENTIAL:** Normally, contacts will close within 2% of full scale value and break within 10% of full scale value.

**INSULATION:** Breakdown 300 volts AC from Relay contacts to meter circuit. 3 KV AC from Relay terminals to mounting panel. (All Tests at 60 cycles.)

#### SUGGESTED COMPONENTS FOR SLAVE RELAY CIRCUITS

INPUT VOLTAGE	PROTECTIVE DIODE	SPDT	DPDT	3PDT
15 DC VOLTS	1N91	SIGMA: 41F-5000-S/SIL ADVANCE: GHE/IC/2500 KURMAN: 5D1CA42D	SIGMA: 42R0-2500-S/SIL KURMAN: 5D2CB40D	KURMAN: 5D3CB39D

#### CIRCUITS



### CONTACTLESS TYPE—MODEL 3324XA

Contactless types are intended for those applications in which utmost reliability, operation on small differential or small power is desired. Set points are adjusted thru external, front adjusted gear drive. Set point is indicated by separate lance pointers. Sensing is accomplished thru an infinite life lamp and photo-conductors. A solid state switching circuit and D.P.D.T. slave relay are provided (internally) for each control point. Slave relays will switch 10 amperes @ 115 Volts A.C.

#### SPECIFICATIONS

**CALIBRATION ACCURACY:**  $\pm 2\%$  of Full Scale.

**CONTROL POINT ADJUSTMENT:** Control points are externally adjustable over 95% of the scale arc. Control point indication is within 2% of actual switching.

**CONTROL POINT DIFFERENTIAL:** Difference between "on" and "off" is within .5% of Full Scale.

**POWER REQUIREMENTS:** 115 Volts A.C. 50-500 CPS. D.C. power required for sensing and switching is provided by the external power module furnished with the relay.

**OUTPUT:** D.P.D.T. relay contacts for each control point. Contacts rated @ 10 amperes, 115 A.C. resistive.

**METER INDICATION:** Continuous, unaffected by control point setting.

**CONTROL CIRCUITRY:** Fail-safe. Both slave relays "open" in event of power failure.

Sept. '64 Availability

#### RANGES AND PRICES

##### CONTACT TYPE—MODEL 29XA

##### CONTACTLESS TYPE—MODEL 3324XA

RANGE	DUAL CONTROL			RANGE	SINGLE CONTROL			DOUBLE CONTROL	
	Resist. Approx. Ohms	Cat. No.	Price		Resist. Approx. Ohms	Cat. No.	Price	Cat. No.	Price
<b>DC Microammeters</b>									
0-50	5200	7032	\$44.10	0-50	3000	16451*	\$90.00	16470*	\$123.90
0-100	1800	7034	42.15	0-100	1300	16452*	87.30	16471*	121.50
0-200	1000	7036	39.60	0-200	570	16453*	87.30	16472*	121.20
0-500	280	7038	39.00	0-500	220	16454*	87.30	16473*	121.20
<b>DC Milliammeter</b>									
0-1	140	7040	38.10	0-1	80	16455*	86.40	16474*	120.30
<b>DC Millivoltmeter</b>									
0-50	10	7050	38.25	0-50	10	16460*	86.70	16480*	120.75

\*New Model Additions.

## GLOSSARY OF TERMS

# INSTRUMENTS THAT STAY ACCURATE

The information in this section is intended to give a basic understanding of the terms commonly used in the Electrical Indicating Instrument Industry. Some of the information, as noted\*, has been reproduced with permission from the American Standards Association.

### ACCURACY TOLERANCE

The measure of a meter's ability to provide indications corresponding to the absolute value of electrical energy applied.

Accuracy is customarily expressed as a percentage of full scale value (see Note 1). To determine the degree of accuracy of a meter at a given point, the rated full scale value, the actual value of energy applied and the value indicated by the meter must be known.

Note 1. Full scale value in meters with zero at a point other than end scale is the arithmetic sum of the two end scale values.

The formula for expression of a meter's accuracy, in percent of full scale, at a point is:

$$\text{Accuracy} = \frac{I - A}{F.S.} \times 100$$

I = Value Indicated by Meter

A = Actual Value of energy applied to meter

F.S. = Rated full scale value of meter

Note: Disregard the sign in determining the degree of accuracy.

Examples: A 0-5 milliamp meter has a current of 4.30 milliamps applied to it. The meter reads 4.25 milliamps. The meter accuracy at that point is:

$$1. \% \text{ Accuracy} = \frac{4.25 - 4.30}{5.00} \times 100$$

$$2. \% \text{ Accuracy} = \frac{.05}{5.00} \times 100$$

$$3. \% \text{ Accuracy} = .01 \times 100$$

$$4. \text{ Accuracy} = 1.0\%$$

A 5-0-10 voltmeter has 7.0 volts applied to it. The meter reads 7.2 volts. The meter accuracy at that point is:

$$1. \% \text{ Accuracy} = \frac{7.2 - 7.0}{5 + 10} \times 100$$

$$2. \% \text{ Accuracy} = \frac{.2}{15} \times 100$$

$$3. \% \text{ Accuracy} = .0133 \times 100$$

$$4. \text{ Accuracy} = 1.33\%$$

### AIR DAMPED

A construction utilizing an air vane to achieve movement damping. This vane is usually housed in a closed chamber to increase the damping action.

### AVERAGE VOLTAGE

The sum of the instantaneous voltages in a half cycle wave shape divided by the number of instantaneous voltages. In a sine wave, the average voltage is equal to 0.637 times the peak voltage.

### BALANCE (Position Influence)\*

Position influence is the change in the indication of an instrument which is caused solely by a position departure from the normal operating position.

### DAMPING

Damping of an instrument is the term applied to its performance to denote the manner in which the pointer settles to its steady indication after a change in the value of the measured quantity.

Two general classes of damped motion are distinguished as follows:

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(a) Periodic, in which the pointer oscillates about the final position before coming to rest.

(b) Aperiodic, in which the pointer comes to rest without overshooting the rest position. Sometimes referred to as overdamping.

The point of change between periodic and aperiodic damping is called critical damping.

Note: An instrument is considered to be critically damped when overshoot is present but does not exceed an amount equal to one half the rated accuracy of the instruments.

### DAMPING FACTOR

The ratio of the steady deflection to the difference between maximum momentary deflection and steady deflection. The deflections are produced by sudden application of a constant value of electrical energy and are measured in angular degrees. Unless otherwise specified, end scale deflection is used as maximum momentary deflection. To determine the damping factor, the total angular deflection from zero to end scale must be known.† These angles can then be substituted in the formula:

$$\text{Damping Factor} = \frac{D_s}{D_m - D_s}$$

Where:  $D_s$  = Steady state deflection in angular degrees

$D_m$  = End scale deflection in angular degrees

†In linear scale meters, very close approximations can be made using the scale graduations to determine the deflection angles.

Example: A 0-100 D.C. voltmeter has a current suddenly applied that causes a momentary end scale deflection. After the pointer settles to a rest position, the meter reads 82 volts. The damping factor is:

$$1. DF = \frac{82}{100 - 82}$$

$$2. DF = \frac{82}{18}$$

$$3. DF = 4.5$$

### DECIBEL OR D.B.

A decibel is a logarithmic unit for the expression of the ratios of two amounts of power. The number of decibels denoting such a ratio is equal to 10 times the  $\text{LOG}_{10}$  of the ratio.

$$N = 10 \text{ LOG}_{10} \frac{P_1}{P_2}$$

N = Number of Decibels

P<sub>1</sub> = Initial Power Level

P<sub>2</sub> = New Power Level

### END SCALE VALUE\*

The end scale value of an instrument is the value of the actuating electrical quantity that corresponds to end scale indication. When zero is not at the end or at the electrical center of the scale, the higher value is taken.

Note: Certain instruments such as power-factor meters, ohmmeters, etc. are necessarily excepted from this definition.

### EXPANDED SCALE METER

A meter in which the ratio of deflection per unit of applied energy becomes greater as the energy approaches a specified value.

### FREQUENCY INFLUENCE†

The change in indication due solely to a frequency change of the applied energy from a specified frequency.

Frequency influence is usually expressed as a percentage change of full scale value \*\* for a specified frequency change.

†Does not apply to frequency meters.

\*\*The full-scale value is equal to the largest value of the actuating electrical quantity which can be indicated on the scale or, in the case of instruments having their zero between the ends of the scale, the full scale value is the arithmetic sum of the values of the actuating electrical quantity corresponding to the two ends of the scale.

## FRICITION

The difference between tapped and untapped meter readings due to the combination of pivot friction and pivot roll. Friction is usually checked by making a substantial change in the applied energy (5-10%) at a sufficiently slow rate so that no overshoot occurs. The meter indication is then noted and, maintaining the same energy level, the meter is tapped. The difference between the two indications is the friction error. It is customary to express the error as a percentage of full scale value.

Since friction is influenced by meter position, the position(s) in which the observation is made must be stated.

## FULL SCALE VALUE\*

The full scale value is equal to the largest value of the actuating electrical quantity which can be indicated on the scale or, in the case of instruments having their zero between the ends of the scale, the full-scale value is the arithmetic sum of the values of the actuating electrical quantity corresponding to the two ends of the scale.

*Note:* Certain instruments such as power-factor meters, ohmmeters, etc. are necessarily excepted from this definition.

## IMPEDANCE

The apparent resistance, expressed in ohms, offered by an alternating current circuit to the passage of electrical energy.

Since frequency is one of the factors affecting impedance, the frequency of applied energy must be specified.

## LOGARITHMIC SCALE METER

A meter having deflections proportional to the logarithms of the applied energies.

## MAGNETIC INFLUENCE\*

The magnetic-platform influence is the change in indication caused solely by the presence of a magnetic platform on which the instrument is placed.

*Note:* For the purposes of this standard, the influence is determined as the percentage change in indication when the instrument is placed in its normal operating position on a demagnetized steel plate, extending at least 6 inches beyond the instrument on all sides, and at least 0.25 inch thick as compared with its indication when isolated from extraneous magnetic material.

## MAGNETICALLY DAMPED

Meters in which the damping is achieved by moving a metal vane through a magnetic field. This motion induces currents in the vane which sets up magnetic fields opposing those of the stationary magnets thus tending to bring the pointer to rest. This type of damping is found in many quality moving iron and dynamometer type instruments.

## METER RESISTANCE

Resistance of the meter as measured at the terminals at a given reference temperature.

When applied to rectifier type meters, the frequency and wave shape of the applied energy, as well as the indicated value at which the measurement is to be made, must be specified.

Normally, the resistance of a rectifier type meter is measured by the voltage doubling method, outlined below:

The meter is energized to the chosen scale position at which the resistance is to be measured. The voltage required to achieve this deflection is noted. A non-inductive, variable resistor is then connected in series with the meter and a voltage twice that of the previously noted voltage is applied. The resistor is then adjusted until the meter again deflects to the original scale position. The meter resistance is then considered to be equal to the value of the adjusted resistor.

## OVERSHOOT\*

Overshoot is the ratio of the overtravel of the indicator beyond a new steady deflection to the change in steady deflection when a new constant value of the measured quantity is suddenly applied. The overtravel and deflection

are determined in angular measure and the overshoot is usually expressed as a percentage.

*Note 1:* Since, in some instruments, the ratio depends on the magnitude of the deflection, a value corresponding to an initial deflection from zero to end scale is used in determining the overshoot for rating purposes.

## PEAK VOLTAGE

The maximum value present in a varying or alternating voltage. This value may be either positive or negative.

## POWER CONSUMPTION

The power necessary to produce end scale deflection of the meter. Power consumption may be expressed in wattage, resistance, voltage, volt-amperes, impedance or current.

## POWER FACTOR

The cosine of the phase angle between an alternating voltage and current in an electrical circuit.

## RECTIFIER TYPE INSTRUMENT

A combination of an instrument sensitive to direct current and a rectifying means whereby alternating current (or voltage) may be measured.

## REPEATABILITY

The measure of a meter's ability to provide repeat readings with the application of a given energy. It is customary to express repeatability as a percentage of full scale value\*.

\*See definition of full scale value and end scale value in this section. Repeatability at a point is usually measured by increasing the applied energy to a given value. The increase is made at a sufficiently slow rate so that no overshoot occurs. The meter deflection is then noted. The energy is then increased at least 10%, and then slowly reduced until the given value is again reached. The new meter deflection is noted. The difference in the two deflections is the repeatability error of the unit at the given value.

A formula for determining a meter's repeatability at a given point is:

$$\text{Repeatability} = \frac{D_2 - D_1}{D_{FS}} \times 100$$

$D_1$  = Deflection, in angular degrees, noted after increasing energy

$D_2$  = Deflection, in angular degrees, noted after decreasing energy

$D_{FS}$  = Full scale deflection in angular degrees

Example: A 90 degree meter has an energy slowly applied. When the chosen energy level is reached, a deflection of 68 degrees is observed. After increasing the energy by 10%, it is slowly reduced to the originally chosen level. A new deflection of 68.5 degrees is observed. The repeatability of the meter at the chosen value is:

$$1. \% \text{ Repeatability} = \frac{68.5 - 68.0}{90} \times 100$$

$$2. \% \text{ Repeatability} = \frac{.5}{90} \times 100$$

$$3. \% \text{ Repeatability} = \frac{50}{90}$$

$$4. \text{ Repeatability} = .555\%$$

## RESPONSE TIME\*

The response time is the time required after an abrupt change has occurred in the measured quantity to a new constant value until the pointer, or indicating means, has first come to apparent rest in its new position.

*Note 1:* Since in some instruments, the response time depends on the magnitude of the deflection, a value corresponding to an initial deflection from zero scale to end scale is used in determining the response time for rating purposes.

## panel meter and test equipment needs.

# Simpson 260® The World's Best Selling VOM Family



## WORLD FAMOUS 260®\* AC/DC Volt-Ohm-Milliammeter

Now the world famous 260 Series 4 and 5P Volt-Ohm-Milliammeter is a better buy than ever before with these new features.

- New Self-Shielded Meter Movement.
- New Higher Accuracy  $\pm 2\%$  DC,  $\pm 3\%$  AC.
- New Ruggedness From Spring-Backed Jewels.
- Greater Repeatability.
- Increased Linearity and Stability.
- Input Protected with an internal 1 amp fuse.
- Mirror Scale (260-4M only).

Complete with test leads No. 7500 and operator's manual.

### ROLL TOP VOMs

260-4.....	\$48.95	260-4RT.....	\$54.95
260-4M.....	\$50.95	260-4MRT.....	\$56.95

### NEW PROTECTED 260 VOM

**Ranges and Features**—The 260-5P has the same ranges and takes the same accessories as Simpson's famous 260-4 VOM.

#### Combined Protection You Won't Find In Any Other VOM

1. Reset button pops out to indicate overload.
2. You cannot reset circuits while overload is present.
3. Protective circuit does *not require* massive overloads which can cause hidden damage to the instrument.
4. All ranges are protected except those not feasible in a portable instrument—1000 and 5000 volts DC and AC; 10 amp DC.

Complete with test leads No. 7500      260-5P.....\$78.95  
and operator's manual.      260-5PRT.....\$84.95

## HIGH ACCURACY 261\* and 270-2\* AC/DC Volt-Ohm-Milliammeters

Simpson's New Model 261 and improved 270 Series 2 VOMs blend the latest in VOM design with Simpson's strict manufacturing control. Their features include: 1. A new self-shielded hi-flux annular meter movement. 2. Spring backed jewels. 3. Special Calibration circuit that increases accuracy. 4. Diode overload protection (Prevents movement burnout even on 200,000% overload). 5. Mirror scale with knife edge pointer. 6. Input protected with an internal 1 amp fuse.

Complete with test leads No. 7500 and operator's manual.

### ROLL TOP VOMs

Model 261.....	\$59.95	Model 261-RT.....	\$65.95
270-2.....	\$64.95	Model 270-2RT.....	\$70.95

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260-5P.....\$78.95



Model 261.....\$59.95



Roll Top  
260-4RT —\$54.95  
260-4MRT — 56.95  
260-5PRT — 84.95  
261-RT — 65.95  
270-2RT — 70.95

Ever-Ready Vinyl  
Carrying Case Only  
#4236—\$9.75



270.....\$64.95

### VOMs

RANGES:	260-4, 260-4M	MODEL 261	270-2
DC VOLTS	0.25 V; 0-2.5 V; 0-10 V; 0-50 V; 0-250 V; 0-1000 V; 0-5000 V		
AC VOLTS	0-2.5 V; 0-10 V; 0-50 V; 0-250 V; 0-1000 V; 0-5000 V		
DC MICROAMPERES		0-50	
DC MILLIAMPERES		0-1; 0-10; 0-100; 0-500	
DC AMPERES		0-10	
DB SCALE (1MW-600Ω)	-20 to +10; -8 to +22; +6 to +36; +20 to +50		
OUTPUT RANGES	0.1 mfd capacitor in series with all AC Voltage ranges through 250 Volts		
RESISTANCE RANGES	R×1 0-2000Ω (12Ω center)	R×100 0-200KΩ (1200Ω center)	R×10K 0-20 megΩ (120KΩ center)
ACCURACIES:			
0-250 MV; 0-2.5 to 0-1000 V DC	±2% F.S.	±1.5% F.S.	±1.25% F.S.
0-5000 V DC	±3% F.S.	±2.5% F.S.	±2.25% F.S.
0-50 Microamperes	±1.5% F.S.	±1.0% F.S.	±.75% F.S.
0-1 Ma to 0-10 A DC	±2% F.S.	±1.5% F.S.	±1.25% F.S.
R×1	±2.5° of Arc	±2.0° of Arc	±1.5° of Arc
R×100, R×10,000	±2.0° of Arc	±1.5° of Arc	±1.0° of Arc
0-2.5 to 0-1000 V AC	±3% F.S.	±3% F.S.	±2.0% F.S.
0-5000 V AC	±4% F.S.	±4% F.S.	±3% F.S.
TEMPERATURE COMPENSATED	NO	NO	YES
MIRROR SCALE	NO	YES	YES
SCALE LENGTH		4.2 inches	
DIMENSIONS		5 1/4" x 7" x 3 1/8"	
NET WEIGHT		3 1/2 lbs.	

ACCESSORIES for 260-4/4M/261/270	Cat. No.	Price	Cat. No.	Price
10,000v High voltage probe.....	0507	\$10.20	Banana plugs and test prods.....	7538 \$ 2.5
25,000v High voltage probe.....	0508	11.50	Leather Carrying Case.....	1818 8.5
50,000v High voltage probe.....	0509	12.50	Ever-Ready Carrying Case.....	4236 9.7
Banana plugs and alligator clip.....	7500	2.10	Roll top safety case only.....	0249 9.9

\*EXCLUSIVE SIMPSON ADJUST-A-VUE HANDLE

# INSTRUMENTS THAT STAY ACCURATE

**Note 2.** The pointer is at apparent rest when it remains within a range on either side of its final position equal to one half the accuracy rating, when determined as specified in *Note 1*.

## R.M.S. VOLTAGE

The effective value of a varying or alternating voltage. The effective value is that value which would produce the same power loss as if a continuous voltage were applied to a pure resistance. In sine wave voltages, the R.M.S. voltage is equal to 0.707 times the peak voltage.

## SCALE LENGTH

The length of the imaginary arc described by the tip of the pointer or other indicating means used. If the pointer tip extends beyond the scale markings, the pointer shall be considered to end at the outer edge of the shortest scale mark. On multi scale instruments, the scale length shall be considered to be equal to the length of the longest scale.

## SELF-CONTAINED INSTRUMENT

A self-contained instrument is one in which no accessory items are required to perform its intended function(s)\*. If not specified, a manufacturer may optionally supply either a self contained meter or one with external accessories.

\*If a meter is specified "0-500 D.C. Microamperes, with scale reading 0-1000 Volts," a 500 ua meter without an internal resistor would be considered self-contained since the established intent is for the meter to operate as a microammeter.

If the specification had read, "0-1000 D.C. Volt, 2000 ohms per volt," the intent is for operation as a voltmeter. A meter having an internal resistor would be necessary to meet the specification. A 500 microampere meter without an internal resistor would not be considered self-contained.

## SQUARE LAW SCALE METER

A meter in which the deflection is proportional to the square of the applied energies.

## SYMMETRY (Applies only to off-set zero meters)

The measure of a meter's ability to provide corresponding indications on each side of zero when the polarity of the applied energy is reversed.

Symmetry error is customarily expressed as a percentage of *actual* full scale value.\*

\*See definition of full scale value in this section.

To determine the symmetry error at a point, the actual full scale energy, the actual energy necessary to cause deflection to the selected point and the actual energy necessary to cause deflection to the corresponding point on the other side of zero must be known.

The symmetry error for a selected point or points can be determined by use of the formula:

$$\% \text{ Symmetry error} = \frac{I_x - I_y}{I_{FS}} \times 100$$

*Note:* Disregard the sign in determining the degree of symmetry.

$I_x$  = Actual energy for deflection to a selected point.

$I_y$  = Actual energy for deflection to the corresponding indication.

$I_{FS}$  = Actual energy for full scale deflection.

Example: A 10-0-10 Voltmeter requires 10.3-0-10.6 Volts for end scale deflections. Application of 8.1 volts is necessary to produce an indication of 8.0 Volts on the right side and 8.25 volts is necessary to cause a corresponding indication on the left side. The symmetry error at the 8.0 Volt point is:

$$1. \% \text{ Symmetry Error} = \frac{8.1 - 8.25}{10.3 + 10.6} \times 100$$

$$2. \% \text{ Symmetry Error} = \frac{.15}{20.9} \times 100$$

$$3. \text{ Symmetry Error} = .72\%$$

The symmetry error at the 10.0 Volt point is:

$$1. \% \text{ Symmetry Error} = \frac{10.3 - 10.6}{10.3 + 10.6} \times 100$$

$$2. \% \text{ Symmetry Error} = \frac{.3}{20.9} \times 100$$

$$3. \text{ Symmetry Error} = 1.44\%$$

## TEMPERATURE INFLUENCE

The change in indication due solely to a change in ambient temperature from a specified reference temperature. Temperature influence is usually expressed as a percentage of full scale value (see *NOTE 1* under full scale value definition this section) for a specified temperature change.

## TORQUE

A rotational moment applied to the moving system. At a steady state deflection, the mechanically applied torque is equal and opposite to the electrically developed torque.

Torque is usually expressed in millimeter grams for a given angular deflection.

## TORQUE TO WEIGHT RATIO

The ratio of the mechanical torque at a given angular deflection to the weight of the moving system. The torque may be expressed in millimeter grams at 360 degrees and the weight may be expressed in grams.

This ratio is sometimes arbitrarily referred to as the "figure of merit."

## TRACKING

The ability of an instrument to indicate at the division line being checked when energized by corresponding proportional values of actual end scale excitation, expressed as a percentage of actual end scale value. The tracking error test is performed by initially setting the pointer on zero using the zero corrector, then applying sufficient excitation to produce end scale deflection precisely. The excitation is then reduced to amounts which will produce deflection to the previously selected scale markings. Tap the instrument before setting zero and before each reading.

$$\text{Tracking error \%} = \frac{I_A - I_R}{I_{ES}} \times 100$$

$I_A$  = actual value of excitation required to produce the selected deflection

$I_R$  = the value of excitation for the selected deflection, obtained by proportional values of actual end scale excitation

$I_{ES}$  = actual value of excitation for end scale deflection.

## VOLUME UNIT OR V.U.

A volume unit is a logarithmic unit for the expression of the ratios of two amounts of power. It is equal to a decibel when a reference level of one milliwatt at 600 ohms is used.

## VOLT AMPERE(S)

The product of the R.M.S. voltage applied to a circuit and the R.M.S. current, in amperes, flowing through it.

## WAVEFORM INFLUENCE

The change in indication, caused solely by a change in waveform from a specified waveform, of the applied current and/or voltage.

The waveform influence is usually expressed as a percentage change of full scale value (see *NOTE 1* under full scale value definition this section) for a specified waveform change.

**See your Electronic Distributor for your stock panel meters.**



BAKELITE BASE IS SUPPLIED UP TO 200 AMPERES



SWITCHBOARD TYPE  
100 THROUGH 7000 AMPS



CURRENT TRANSFORMER



EXTERNAL MULTIPLIER  
MODEL 183  
For Usage  
See Voltmeter Footnotes

### EXTERNAL PORTABLE AND SWITCHBOARD SHUNTS—FOR USE WITH DC AMMETERS

These shunts are adjusted for a 50 millivolt drop for use with switchboard and panel ammeters where external shunts are required. Portable shunts are bakelite base and supplied up to 200 amperes. (Prices shown include 5' leads.)

#### PORTABLE SHUNTS

Amps.	Part No.	Price
1	6700	\$6.90
5	6703	6.90
10	6704	6.90
15	6705	6.90
25	6707	6.90
30	6708	6.90
50	6709	6.90
75	6711	6.90
100	6713	6.90
150	6714	6.90
200	6715	6.90

#### SWITCHBOARD SHUNTS

Amps.	Part No.	Price
100	6500	\$6.90
150	6503	7.35
200	6504	7.35
250	6505	7.35
300	6506	7.35
400	6507	9.30
500	6508	11.25
600	6509	13.50
750	6510	16.65
800	6511	17.70
1000	6512	21.90
1200	6513	26.55
1500	6514	32.70
2000	6515	37.20
2500	6516	47.25
3000	6517	56.70
3500	6518	79.35
4000	6519	96.15
4500	6520	105.75
5000	6521	113.40
6000	6522	126.15
7000	6523	153.60

### CURRENT TRANSFORMERS—FOR USE WITH AC AMMETERS

These current transformers are of the inserted one turn primary type for use with switchboard and panel ammeters where external transformers are required.

AMPERE RANGES Primary	Secondary	Part No.	Price
50	5	1293	\$17.40
75	5	1306	12.60

### MODEL 183 MULTIPLIER SERIES

Simpson External Multipliers are available for immediate delivery from your local distributor in the ranges listed below. Other intermediate ranges are available on special order: DC Volts to 5000; AC Volts to 1000. Send your specifications for a quotation.

#### AC VOLTS—166 OHMS/VOLT

Range	Multiplier Resistance Ohms	Meter Volts Drop	Part No.	Price
0-500	58,333	350	8562	\$5.10
0-600	75,000	450	8563	6.00
0-750	100,000	600	8564	6.75
0-1000	141,666	850	8565	8.25

#### DC VOLTS—2000 OHMS/VOLT

Range	Multiplier Resistance Megohms	Meter Sensitivity DCUA	Part No.	Price
0-500	1	500	8552	\$4.0
0-750	1.5	500	8553	4.3
0-1000	2	500	8554	4.3
0-1250	2.5	500	8555	4.3
0-1500	3	500	8556	4.6
0-2000	4	500	8557	4.6
0-2500	5	500	8558	4.8
0-3000	6	500	8559	4.8
0-4000	8	500	8560	5.2
0-5000	10	500	8561	5.8

## SIMPSON TEST EQUIPMENT

Add-a-tester Adapters Expands the famous 260 or 270 VOM as the need arises.



Printed in U.S.A.

100,000 ohms per volt  
AC-DC Volt-  
Ohm-Microammeter  
Model 269



WORLD'S LARGEST  
MANUFACTURER OF  
ELECTRONIC  
TEST EQUIPMENT

Write for bulletin 2066



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(Area Code 312)  
WESTERN DIVISION:  
Simpson Instruments  
1130 Simpson Way (P.O. Box 488)  
Escondido, California 92026  
Phone: 714 745-8202  
Export Dept.:  
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Cable: Amergaco  
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London, Ont.



# GOOF-PROOF VOM



Here's the most foolproof volt-ohm-milliammeter ever made. Protection approaches 100%. It's the VOM you will want to have on hand where inexperienced people are running tests . . . or will reach for yourself on those days when you're all thumbs. The 260-5P will save you all kinds of headaches from burned out meters and resistors, bent pointers, damaged pivots, cracked jewels, and inaccuracies caused by overheating.

**Combined Protection You Won't Find In Any Other VOM**

1. Reset button pops out to indicate overload.
2. You cannot reset circuits while overload is present.
3. Protective circuit does *not require* massive overloads which can cause hidden damage to the instrument.
4. All ranges are protected except those not feasible in a portable instrument—1000 and 5000 volts DC and AC; 10 amp DC.

**SIMPSON**  
**260-5P**

**ONLY \$78.95**

*At your distributors by December '64*

**Ranges**—The 260-5P has the same ranges and takes the same accessories as Simpson's famous 260-4 VOM. See page 20 in this catalog.

# Simpson

Representatives in Principal Cities  
...See Telephone Yellow Pages



**SIMPSON ELECTRIC COMPANY**

5202 W. Kinzie Street, Chicago, Ill. 60644 • Phone: (312) EStebrook 9-1121

**Export Dept.**: 400 W. Madison Street, Chicago, Ill. 60606 Cable, Amergaco

**California:** Simpson Instruments, Inc., P.O. Box 488, 1130 Simpson Way, Escondido, Calif. • Phone: (714) SH 5-8202

**In Canada:** Bach-Simpson Ltd., London, Ontario

**In India:** Ruttonsha-Simpson Private Ltd., International House, Bombay-Agra Road, Vikhroli, Bombay

**WORLD'S LARGEST MANUFACTURER OF ELECTRONIC TEST EQUIPMENT**

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